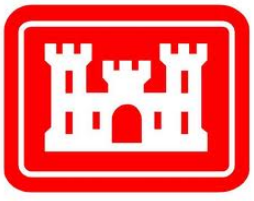
Berryessa Creek Element
Coyote and Berryessa Creeks
Flood Control Project
Santa Clara County, California

Appendix B: Engineering and Design

Part IV

Design and Cost of Alternatives



BERRYESSA CREEK PROJECT

APPENDIX B, Part IV: Design and Cost of Alternatives

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CHAPTER 1: INTRODUCTION

This portion of the engineering appendix (*Appendix B, Part IV: Design and Cost of Alternatives*) describes the underlying assumptions behind project alternative designs, quantity takeoffs, and cost estimates for the Berryessa Creek project alternatives. Design considerations and corresponding costs are presented for individual project features along Berryessa Creek. The project features include modifications to channel reaches and bridge and culvert crossings located between I-680 at the upstream end of the project and Calaveras Boulevard at the downstream end. The project reach includes eight existing bridge and culvert crossings within the project area, as described in Table 1.1.

Table 1.1 Existing Bridge and Culvert Crossings within Berryessa Creek Project Area

Station	Description	Approximate Dimensions
248+00	I-680	60-ft top span x 10-ft height, trapezoidal channel
210+90	Montague Expy	Double 12-ft span x 9-ft height box culvert
206+05	UPRR Trestle	40-ft top span x 10-ft height, 4 sets of piers
186+80	UPRR Culvert	Triple 11-ft span x 12-ft height box culvert
182+10	Ames Avenue	75-ft top span x 10-ft height, trap. channel, single pier
168+80	Yosemite Drive	75-ft top span x 10-ft height, trap. channel, single pier
137+50	Los Coches Street	75-ft top span x 10-ft height, trap. channel, single pier
131+05	Calaveras Blvd	50-ft span x 7-ft height, 4 continuous piers

The following chapters discuss the proposed modifications to individual bridge and culvert crossings and the channel reaches bounded by each crossing. Project features are discussed in order from upstream to downstream. The hydraulic conveyance capacity of proposed channels and bridge and culvert crossings are based on the results presented in *Appendix B, Part I: Hydraulic Analysis of Alternatives*. Further discussion on damages, economic costs and benefits, and the selection of the level of performance is included in *Appendix C: Economics*.

All vertical elevation data referenced in this report, including cross sectional and profile plots, are in the NAVD88 vertical datum. Some cross section and profile views are shown with substantial vertical exaggeration. All cross sections are shown looking downstream, and references to right and left bank are likewise based on a downstream orientation. Stationing is based on the HEC-RAS cross section identifiers as described in *Appendix B, Part I: Hydraulic Analysis of Alternatives*. Figure 1.1 shows the relative location of the individual bridge and culvert crossings within the project footprint. A more detailed project footprint, including temporary construction easements, staging areas, and access routes, is presented in the overview exhibits of the accompanying set of 11”x17” plan/profile sheets (Sheets G-3, G-4, and G-5).

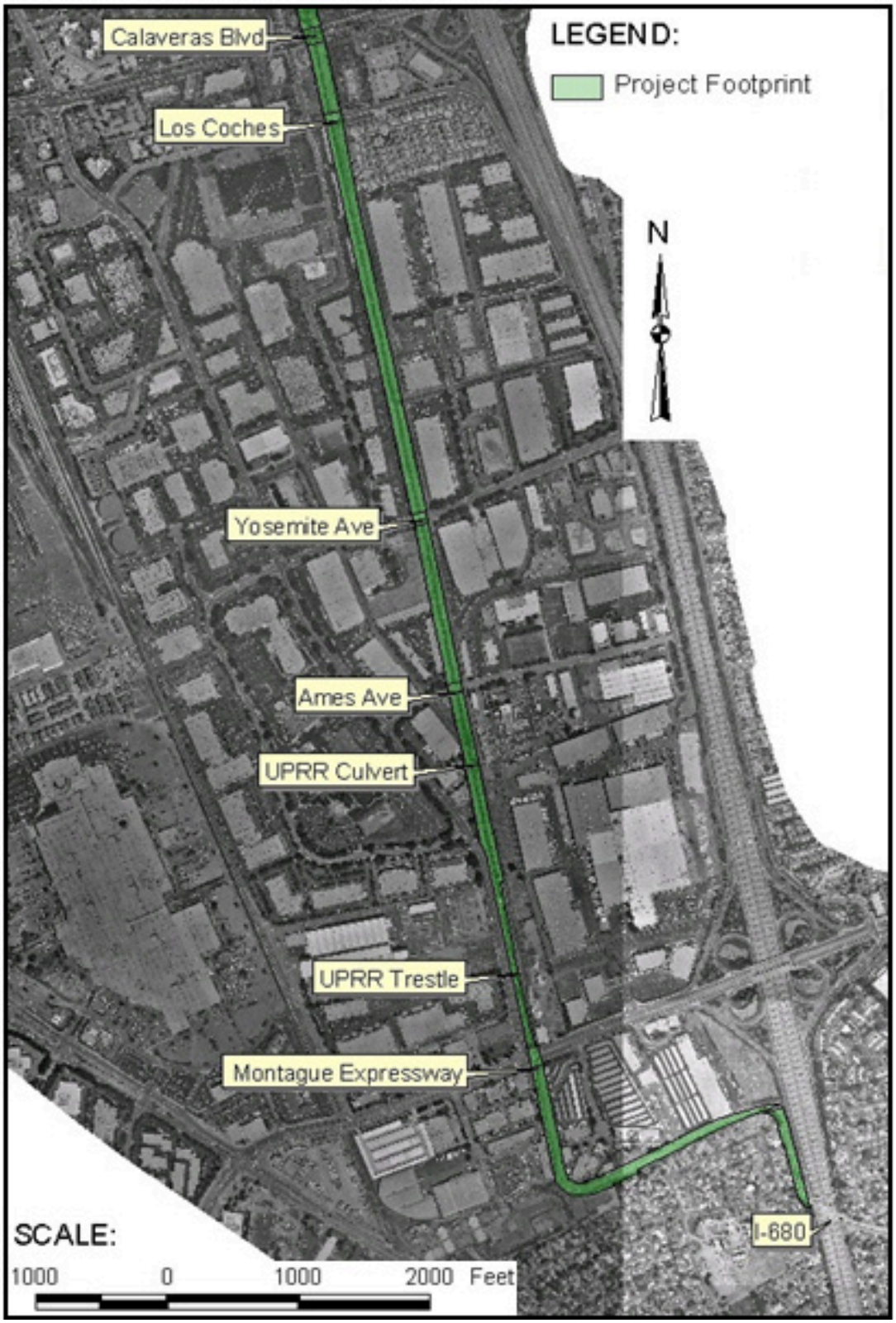


Figure 1.1 Berryessa Creek Project Footprint

CHAPTER 2: ALTERNATIVES

2.1 Preliminary Array of Alternatives

The preliminary array of alternatives included an incised trapezoidal channel, a terraced trapezoidal channel, a walled trapezoidal channel, and the Authorized Plan (a concrete trapezoidal channel). Further details on the evaluation criteria, screening process, and refinement of the alternatives array are included in *Appendix B, Part I: Hydraulic Analysis of Alternatives* and *Appendix C: Economics*.

The 1990 Authorized Plan was designed for 1% chance exceedance discharges that have since been modified under revised hydrologic analyses. Levees, floodwalls, and tops of bank in the current project alternatives are designed according to risk and uncertainty principles as described in *Appendix B, Part I: Hydraulic Analysis of Alternatives*.

2.2 Final Array of Alternatives

Three project alternatives are being evaluated under the final array of alternatives along with a no-action alternative. The project features comprising each alternative are summarized below:

- *Alternative 1 (No Action)*. Without-project condition, assuming routine maintenance.

- *Alternative 2A/d (Incised Trapezoidal Channel)*. Earthen trapezoidal channel section with varying bottom width and 2:1 sideslopes. Free-standing concrete floodwalls as needed and in-channel access road where suitable. This alternative applies a moderate level of flood risk reduction, passing the 50% certainty 0.01 event without additional certainty. Under this alternative, all bridge and culvert crossings remain in their existing configuration, with the exception of the UPRR trestle, which is replaced with a triple barrel concrete box culvert.

- *Alternative 2B/d (Incised Trapezoidal Channel)*. Earthen trapezoidal channel section with varying bottom width and 2:1 sideslopes. Free-standing concrete floodwalls as needed and in-channel access road where suitable. This alternative applies a FEMA-certifiable level of flood risk reduction, passing the 0.01 event with 95% certainty. Under this alternative, all bridges and culverts are replaced with the exception of I-680, Ames Avenue and Yosemite Drive.

- *Alternative 4/d (Walled Trapezoidal Channel)*. 10-ft bottom width earthen low-flow channel with 3:1 sideslopes, 3 ft deep. Two vegetated floodplain benches bounded by vertical concrete floodwalls, 32-ft bench width on the left bank, and 10-ft width on the right bank. Access road location varies. Wall extensions as required to contain flows. This alternative applies a FEMA-certifiable level of flood risk reduction, passing the 0.01 event with 95% certainty. Under this alternative, all bridges and culverts are replaced with the exception of I-680, Ames Avenue and Yosemite Drive.

All project alternatives include a 15-foot obstruction-free zone outside of the project features along both banks. The obstruction-free zone also acts as a vegetation-free zone to ensure compliance with current vegetation criteria for levees and floodwalls. The obstruction-free zone also acts as an access route for flood-fighting and maintenance activities.

2.2.1 Alternative 1

Alternative 1 is the no action alternative and represents without-project conditions, assuming routine maintenance. The performance of the existing creek and flood control system, including a description of the existing capacities of channel reaches and bridge and culvert crossings, is described in *Appendix B, Part I: Hydraulic Analysis of Alternatives*. The no-action alternative assumes channel reaches and bridge and culvert crossings are fully maintained to remove accumulated debris and repair flood damage. For areas with existing debris accumulation or erosion problems, the hydraulic performance of the without-project conditions model described in *Appendix B, Part I: Hydraulic Analysis of Alternatives* may therefore differ from the actual observed conditions. Estimated maintenance quantities are described in Chapter 3.

2.2.2 Alternative 2A/d

Schematic sections of Alternative 2A/d are shown in Figure 2.1. This scenario involves the following features:

- Channel excavation and earthen levee construction to the water surface level of the 50% certainty, 0.01 exceedance probability event discharge from I-680 to Calaveras Boulevard
- 2H:1V sideslopes with cellular bank protection and buried riprap scour protection
- Free-standing concrete floodwalls in the immediate vicinity of Montague Expressway as well as between the Piedmont Creek confluence and Calaveras Blvd
- Access road located along the left bank channel slope downstream of Yosemite Drive
- Recreational trail within the obstruction-free zone where primary flood control use allows secondary recreational use
- Replacement of UPRR trestle with triple box culvert
- Construction of transition structures at Montague Expressway, UPRR Culvert, Los Coches Street, and Calaveras Blvd
- Shoring of bridge abutments and construction of transition structures at Ames Avenue and Yosemite Drive to accommodate widened channel
- Utility relocations for storm drains entering the channel or running parallel to the channel that fall within the channel excavation areas

2.2.3 Alternative 2B/d

Schematic sections of Alternative 2B/d are shown in Figure 2.2. This scenario involves the following features:

- Channel excavation and earthen levee construction to the water surface level of the 95% certainty, 0.01 exceedance probability event discharge from I-680 to Calaveras Boulevard
- 2H:1V sideslopes with cellular bank protection and buried rip rap scour protection
- Free-standing concrete floodwalls between I-680 and Montague Expressway and between Yosemite Drive and Calaveras Blvd
- Access road intermittently along one or both banks, within the channel (between the 0.1 and 0.04 exceedance probability event), or both
- Replacement of Montague Expressway Culvert crossing with 60-ft span
- Replacement of UPRR trestle with triple 15-ft box culvert
- Replacement of UPRR culvert with 60-ft span
- Shoring of bridge abutments at Ames Avenue and Yosemite Drive to accommodate widened channel
- Replacement of Los Coches Street Bridge with 100-ft span
- Replacement of Calaveras Boulevard Bridge with 100-ft span
- Utility relocations as required

2.2.4 Alternative 4/d

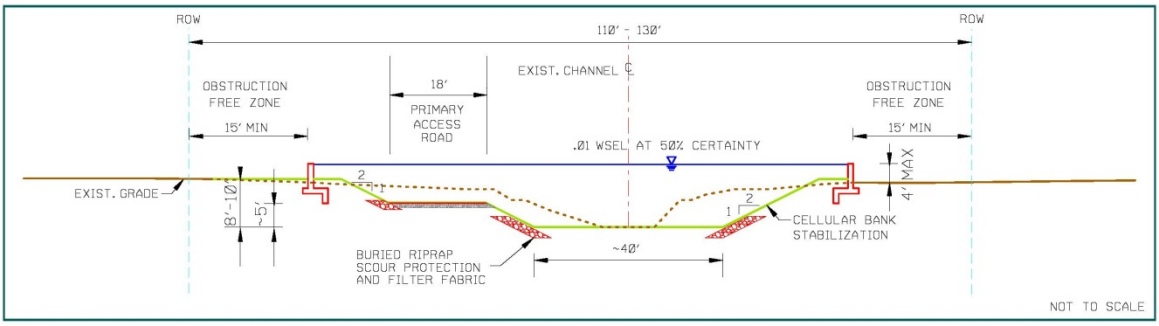
Schematic sections of Alternative 4/d are shown in Figure 2.3. This scenario involves the following features:

- Channel excavation and concrete wall construction to the water surface level of the 95% certainty, 0.01 exceedance probability event discharge from I-680 to Calaveras Boulevard
- Concrete retaining walls to the existing ground surface and above-ground floodwall extensions as required
- Replacement of Montague Expressway Culvert crossing with 60-ft span
- Replacement of UPRR trestle with triple 15-ft box culvert
- Replacement of UPRR culvert with 60-ft span
- Shoring of bridge abutments at Ames Avenue and Yosemite Drive to accommodate widened channel
- Replacement of Los Coches Street Bridge with 100-ft span
- Replacement of Calaveras Boulevard Bridge with 100-ft span
- Utility relocations as required

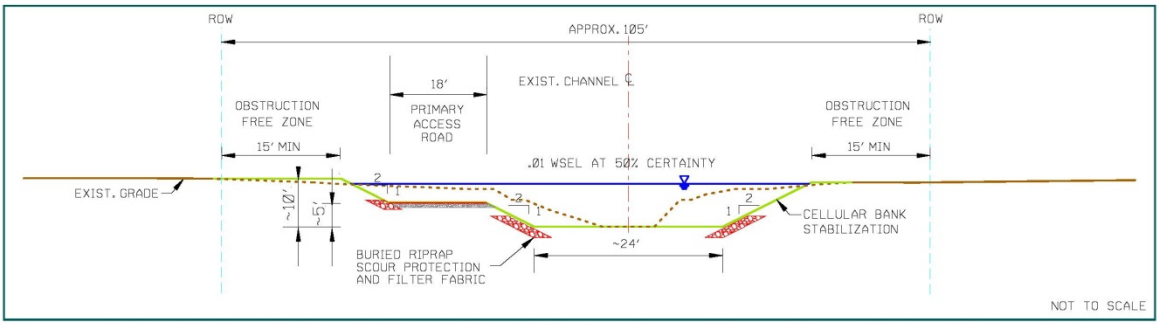
2.3 Description of Project Features in Final Array

Typical sections showing the overall configuration of each alternative are presented in Figure 2.1, Figure 2.2 and Figure 2.3 below. Additional details are shown in the accompanying 35-sheet set of 11”x17” plan/profile figures.

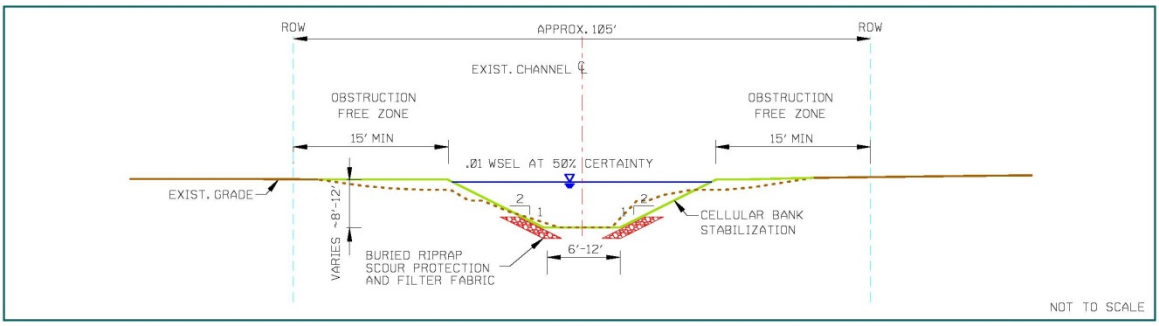
Table 2.1 tabulates the individual channel and bridge/culvert modifications that make up each of the three project alternatives. Utility modifications are required under all scenarios and are not called out individually in the summary table. The addition of optional recreational features along existing and proposed maintenance roads will be addressed further as the project develops.



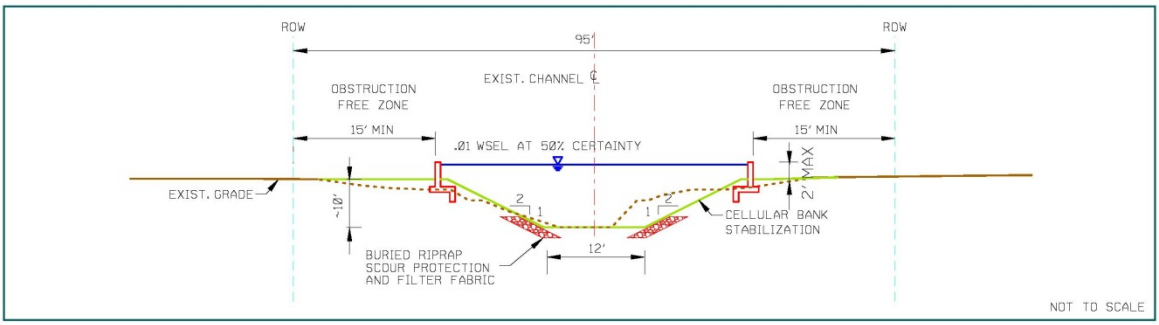
TYPICAL CROSS SECTION, CALAVERAS BLVD TO PIEDMONT CREEK (STA 130 TO 160)



TYPICAL CROSS SECTION, PIEDMONT CREEK TO YOSEMITE DR (STA 160 TO 170)

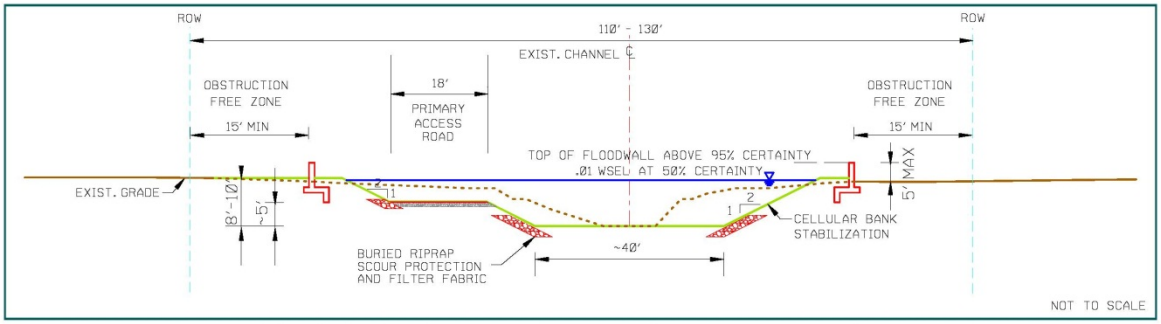


TYPICAL CROSS SECTION YOSEMITE DR TO I-680 (STA 170 TO 212 AND 214 TO 237)

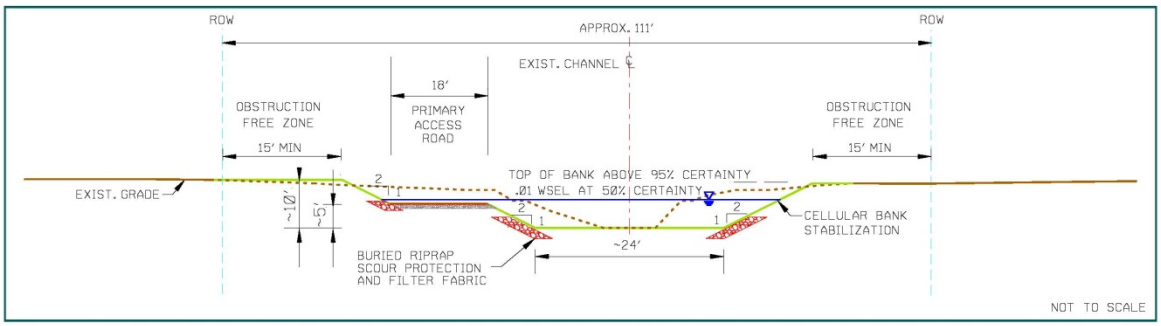


TYPICAL CROSS SECTION, MONTAGUE EXPY TO 200' UPSTREAM (STA 212 TO 214)

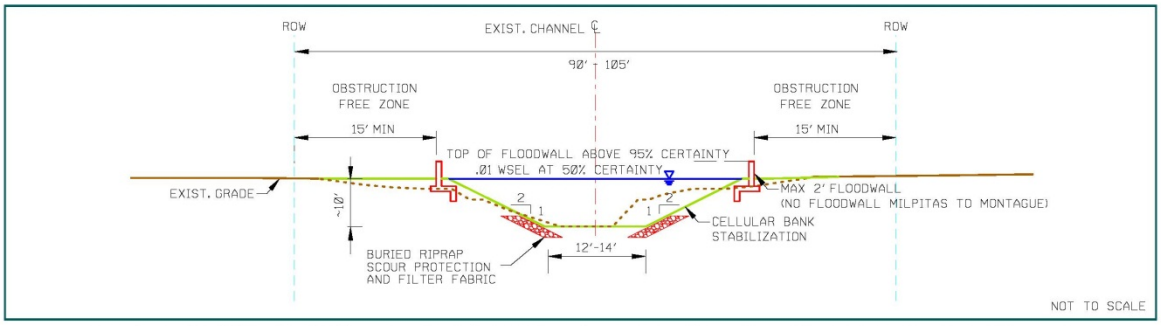
Figure 2.1 Alternative 2A/d Typical Sections



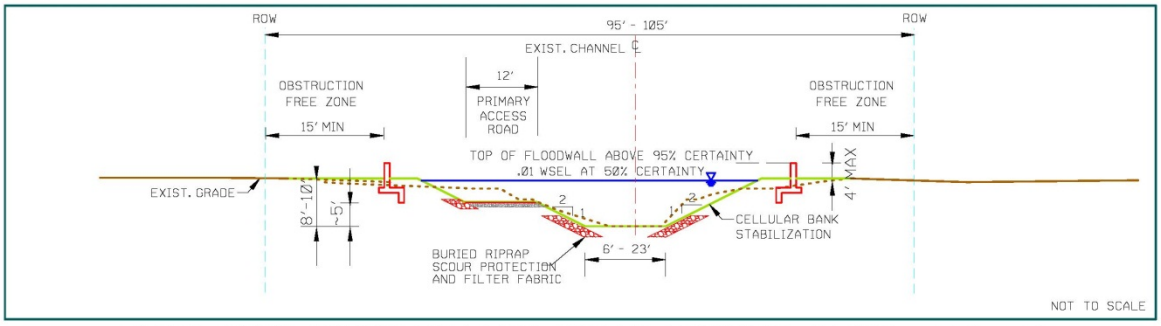
TYPICAL CROSS SECTION, CALAVERAS BLVD TO YOSEMITE DR (STA 130 TO 170)



TYPICAL CROSS SECTION, YOSEMITE DR TO MILPITAS BLVD (STA 170 TO 195)

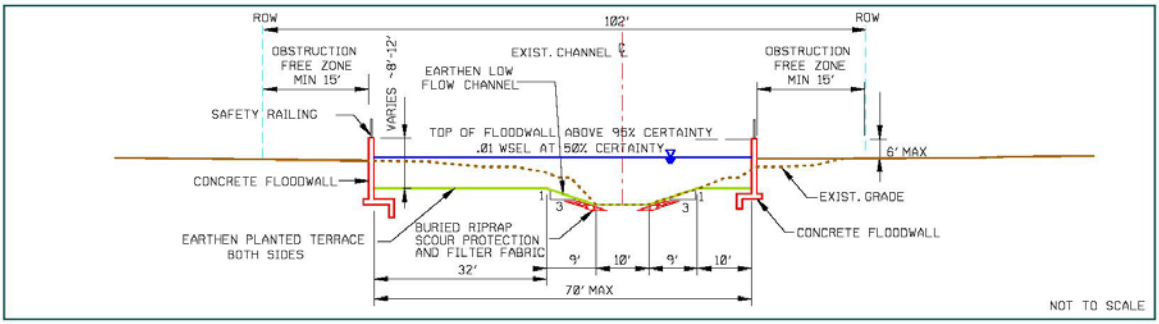


TYPICAL CROSS SECTION MILPITAS BLVD TO I–680 (STA 195 TO 212 AND 230 TO 248)

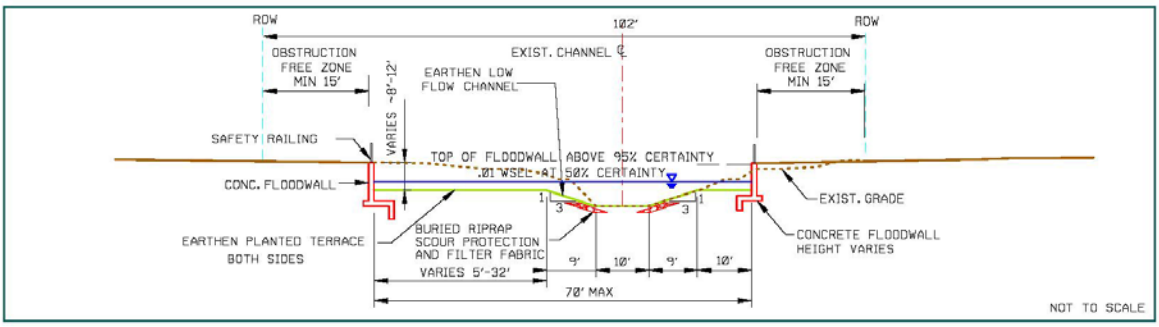


TYPICAL CROSS SECTION, MONTAGUE EXPY TO LAKEWOOD CT (STA 212 TO 230)

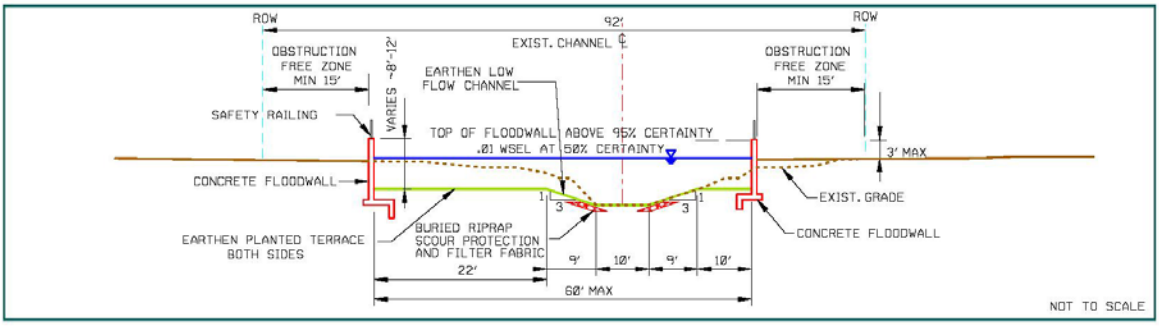
Figure 2.2 Alternative 2B/d Typical Sections



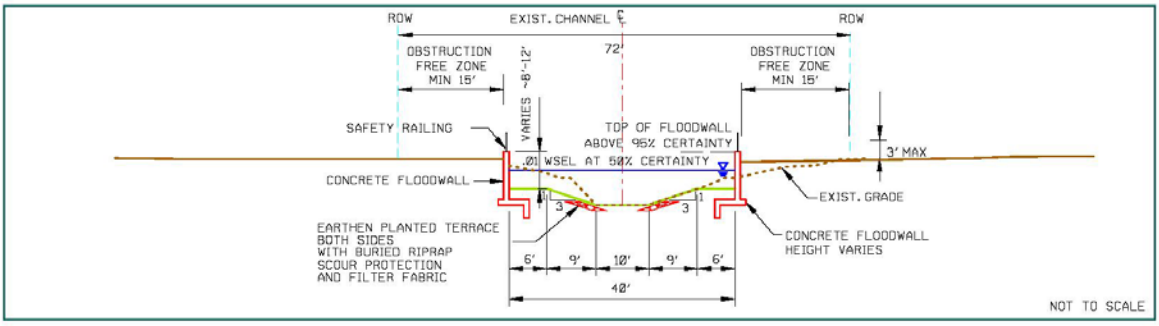
TYPICAL CROSS SECTION, CALAVERAS BLVD TO AMES AVE (STA 130 TO 182)



TYPICAL CROSS SECTION, AMES AVE TO MILPITAS BLVD (STA 182 TO 195)



TYPICAL CROSS SECTION, MILPITAS BLVD TO LAKEWOOD CT (STA 195 TO 230)



TYPICAL CROSS SECTION LAKEWOOD CT TO I-680 (STA 230 TO 248)

Figure 2.3 Alternative 4/d Typical Sections

Table 2.1 Summary of Project Alternative Features

Reach/Structure	Alternative Project Features		
	Alternative 2A/d Incised Trapezoidal Channel	**Alternative 2B/d** Incised Trapezoidal Channel	**Alternative 4/d** Walled Trapezoidal Channel
I-680 Bridge (Sta 248+00)	Remove accumulated sediment at downstream face	Remove accumulated sediment at downstream face	Remove accumulated sediment at downstream face
Channel Reach from I-680 to Montague Expressway (Sta 248+00 – 210+90)	Excavate 6- to 12-foot bottom width earthen channel with cellular bank protection at 2H:1V sideslope; Construct 200 lineal feet of free-standing concrete to maximum height of 2 feet	Excavate 6- to 22-foot bottom width earthen channel with cellular bank protection at 2H:1V sideslope and access road along left bank slope; Construct free-standing concrete floodwall to maximum height of 4 feet	Excavate 10-foot earthen channel with 10 and 22-foot vegetated terraces and vertical concrete walls extending a maximum of 3 feet above existing ground
Montague Expressway Culvert (Sta 210+90)	Tie floodwall into existing headwall at upstream face of structure; Construct transitions to existing wingwalls	Remove existing box culvert Construct raised 60-foot span bridge	Remove existing box culvert Construct raised 60-foot span bridge
Channel Reach from Montague Expressway to UPRR Trestle (Sta 213+90 – 206+05)	Excavate 12-foot bottom width earthen channel with cellular bank protection at 2H:1V sideslope	Excavate 14-foot bottom width earthen channel with cellular bank protection at 2H:1V sideslope; Construct free-standing concrete floodwall to maximum height of 2 feet	Excavate 10-foot earthen channel with 10 and 22-foot vegetated terraces and vertical concrete walls extending a maximum of 3 feet above existing ground
UPRR Railroad Trestle Bridge (Sta 206+05)	Remove existing timber trestle Construct triple 15-foot span by 12-foot rise concrete box culvert with wingwalls	Remove existing timber trestle Construct triple 15-foot span by 12-foot rise concrete box culvert with wingwalls	Remove existing timber trestle Construct triple 15-foot span by 12-foot rise concrete box culvert with wingwalls
Channel Reach from UPRR Trestle to UPRR Culvert (Sta 206+05 - 186+80)	Excavate 12-foot bottom width earthen channel with cellular bank protection at 2H:1V sideslope	Excavate 10 to 12-foot bottom width earthen channel with cellular bank protection at 2H:1V sideslope and access road along left bank slope	Excavate 10-foot earthen channel with 10- and 32-foot vegetated terraces and vertical concrete walls extending to existing ground
UPRR Railroad Culvert (Sta 186+80)	Construct transition to existing wingwalls	Remove existing triple box culvert Construct 60-foot span 12-foot rise bridge	Remove existing triple box culvert Construct 60-foot span 12-foot rise bridge

Reach/Structure	Alternative Project Features		
	Alternative 2A/d Incised Trapezoidal Channel	**Alternative 2B/d** Incised Trapezoidal Channel	**Alternative 4/d** Walled Trapezoidal Channel
Channel Reach from UPRR Culvert to Ames Avenue (Sta 186+80 – 182+10)	Excavate 12-foot bottom width earthen channel with cellular bank protection at 2H:1V sideslope	Excavate 17-foot bottom width earthen channel with cellular bank protection at 2H:1V sideslope and access road along left bank slope	Excavate 10-foot earthen channel with 10- and 32-foot vegetated terraces and vertical concrete walls extending to existing ground
Ames Avenue Bridge (Sta. 182+10)	Excavate 12-foot bottom width channel beneath bridge; Construct abutment and pier protection	Excavate 17-foot bottom width channel beneath bridge; Construct abutment and pier protection	Excavate channel and construct walls beneath bridge; Construct abutment and pier protection
Channel Reach from Ames Avenue to Yosemite Drive (Sta 182+10 – 168+80)	Excavate 15-foot bottom width earthen channel with cellular bank protection at 2H:1V sideslope	Excavate 24-foot bottom width earthen channel with cellular bank protection at 2H:1V sideslope and access road along left bank slope	Excavate 10-foot earthen channel with 10- and 32-foot vegetated terraces; Construct concrete floodwall to extend maximum of 6 feet above existing ground
Yosemite Drive Bridge (Sta 168+80)	Excavate 15-foot bottom width channel beneath bridge transitioning to 24-foot bottom width; Construct abutment and pier protection	Excavate 38-foot bottom width earthen channel beneath bridge; Construct abutment and pier protection	Excavate channel and construct walls beneath bridge; Construct abutment and pier protection
Channel Reach from Yosemite Drive to Los Coches Street (Sta 168+80 – 137+50)	Excavate 26-foot bottom width earthen channel with cellular bank protection at 2H:1V sideslope and access road along left bank slope	Excavate 38-foot bottom width earthen channel with cellular bank protection at 2H:1V sideslope and access road along left bank slope; Construct free-standing concrete floodwall to maximum height of 5 feet	Excavate 10-foot earthen channel with 10- and 32-foot vegetated terraces; Construct concrete floodwall to extend maximum of 6 feet above existing ground
Los Coches Street Bridge (Sta 137+50)	Construct transition to existing structure	Remove existing bridge; Construct 100-foot span bridge with raised deck and 4-foot high solid bridge face	Remove existing bridge**;** Construct 100-foot span bridge with raised deck and 4-foot high solid bridge face

Reach/Structure	Alternative Project Features		
	Alternative 2A/d Incised Trapezoidal Channel	**Alternative 2B/d** Incised Trapezoidal Channel	**Alternative 4/d** Walled Trapezoidal Channel
Channel Reach from Los Coches Street to Calaveras Boulevard (Sta 137+50-131+05)	Excavate 40-foot bottom width earthen channel with cellular bank protection at 2H:1V sideslope and access road along left bank slope; free-standing concrete floodwalls to maximum height of 4 feet	Excavate 38-foot bottom width earthen channel with cellular bank protection at 2H:1V sideslope and access road along left bank slope; Construct free-standing concrete floodwall to maximum height of 5 feet	Excavate 10-foot earthen channel with 10- and 32-foot vegetated terraces; Construct concrete floodwall to extend maximum of 6 feet above existing ground
Calaveras Boulevard Bridge (Sta 131+05)	Construct transition to existing structure	Remove existing box culvert Construct 100-foot span bridge with raised deck	Remove existing box culvert Construct 100-foot span bridge with raised deck
Channel Reach Downstream of Calaveras Boulevard (Sta 131+05 – 129+80)	Construct transition to downstream project	Construct transition to downstream project	Construct transition to downstream project

2.3.1 Channel Modifications

Channel widening is proposed in combination with floodwalls under the project alternatives to meet the desired level of performance for the alternatives. The channel excavation templates are depicted in the typical sections above. The extent of proposed armoring, including toe-down depths and armor rock gradation, may vary from section to section as the design is refined. In narrow reaches, the toe protection may be continuous to maintain the integrity of the channel. The channel profile may require grade control at bridge or utility crossing locations to prevent downcutting of the channel. Further geomorphic and sediment transport analyses may determine whether there is a need for additional grade control.

The typical sections for Alternatives 2A/d and 2B/d include an intermittent access road within the channel at the approximate level of the 0.1 to 0.04 exceedance probability event in order to increase the effective conveyance area within the available right-of-way for larger events and allow maintenance equipment to have closer access to the channel. Alternative levels for the access road may be considered as the design of the selected alternative proceeds. The access road surface would need to be graded and compacted to withstand flood flows, and a cross slope for drainage would be required. Although the access road location is generally shown on the left bank in the cross sections, it may alternatively be located on right bank if deemed appropriate during the design phase, and a secondary access road may be located along the opposite bank. Several tributaries enter the channel from the right, and access to local streets is required along both sides of the tributaries. Final placement should consider findings from additional utility investigations; the final access road configuration may vary from reach to reach.

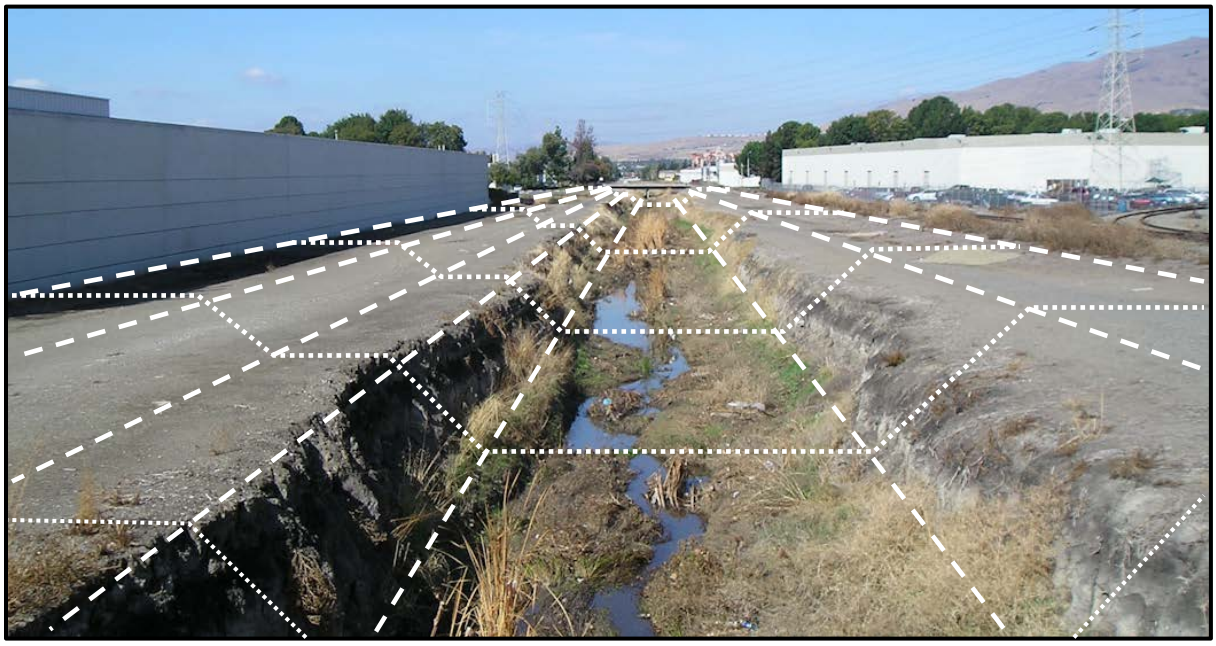


Figure 2.4 Schematic View of Channel Configuration of Alternatives 2A/d and 2B/d

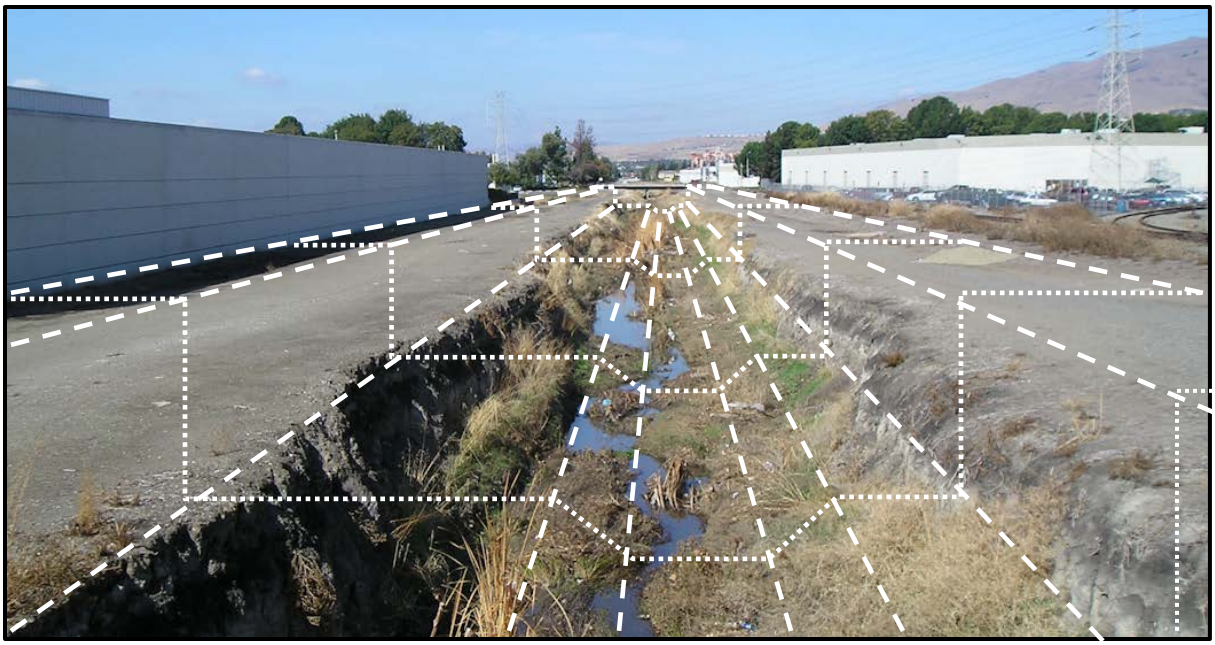


Figure 2.5 Schematic View of Floodwalls and Channel Configuration of Alternative 4/d

Alternative 4/d includes vegetated floodplain terraces. Vegetation would need to be drought-tolerant and/or require irrigation for establishment. Selection of vegetation types should also account for the required root depth and the size of the inner channel. Further details on the vegetation types are included in Chapters 4 and 5 of the main report. While the overall project configuration has been designed to fall within the existing public rights of way, the acquisition of several small parcel areas is required to maintain continuous access along the channel. These areas are shown in further detail in the accompanying plan/profile views. Additionally, temporary construction easements, staging areas, and access routes are required for all three project alternatives. Discrepancies in the available real estate information are described in Tetra Tech, 2005b.

2.3.2 I-680 Bridge

The I-680 Bridge marks the upstream extent of the project. Some debris is present at the downstream face of the bridge. This debris should be removed regularly to ensure that the conditions do not produce higher than anticipated water surface elevations along the channel banks downstream of the bridge. No with-project modifications are proposed for the culvert except that any deferred maintenance will be performed by the local sponsor.

Figure 2.6 Photograph of I-680 Bridge (Looking Upstream)

2.3.3 Montague Expressway

Montague Expressway is a 6-lane arterial crossing over a double barrel 12-ft x 10-ft culvert. The existing bridge allows sufficient capacity for Alternative 2A/d, provided the channel walls tie into the existing structure. For Alternatives 2B/d and 4/d, a replacement span of 70 ft would be required in order to contain the flow in the channel and prevent breakouts. The deck would need to be raised approximately three feet, requiring extensive roadway work, and the headwall would need to tie into upstream and downstream floodwalls. The maintenance road (not shown) would need to transition out of the channel and over the levees or floodwalls.

Figure 2.7 Schematic View of Montague Channel Excavation for Alternative 2B/d

2.3.4 UPRR Trestle

The existing UPRR Trestle is a timber railroad crossing with four sets of piers. There is some discrepancy in the deck height that significantly affects the existing capacity of the trestle, as described in Tetra Tech, 2005a. Due to the condition of the existing structure, excavation around the bed or banks is assumed to be unacceptable, and complete replacement of the trestle is assumed under all project alternatives. A triple barrel concrete box culvert is included in the project scenarios, with replacement configurations applied and modeled using the 1990 Authorized Plan and GDM designs. The cost estimates also assume that a temporary shoo-fly structure would be needed during construction.

Figure 2.8 Schematic View of UPRR Trestle Replacement for Alt 2B/d

2.3.5 UPRR Culvert

The channel transitions to a wider available right-of-way where Milpitas Boulevard veers away from the channel upstream of the UPRR Culvert. The existing UPRR culvert is a triple 11-ft x 11-ft box culvert that crosses Berryessa Creek at a skew angle of almost 60 degrees. The existing structure has sufficient conveyance to meet the requirements of Alternative 2A/d, provided the channel banks are tied into the existing concrete wingwalls. Alternatives 2B/d and 4/d include the complete reconstruction of the culverts with a 60-foot wide span. The cost estimates assume that a temporary shoo-fly structure would be needed during construction.

Figure 2.9 Schematic View of UPRR Culvert Replacement for Alt 2B/d

2.3.6 Ames Avenue Bridge

The Ames Avenue Bridge is a two-lane bridge with a single continuous pier. The span is approximately 80 ft; however, the existing ground blocks much of the cross section below the bridge deck. The existing bridge is retained under all project scenarios. The channel modifications proposed in this reach for Alternatives 2A/d and 2B/d include an access road on the overbank rather than within the channel. The design cross section under the bridge proceeds at 2H:1V from the outside of the span. The bridge is shown in the photograph below along with a typical with-project scenario showing the maximum excavated footprint extending vertically down from the edge of the bridge deck and requiring some shoring to protect the bridge abutments.

Figure 2.10 Schematic View of Ames Avenue Bridge Modifications

2.3.7 Yosemite Drive Bridge

Yosemite Drive carries a 2-lane road over Berryessa Creek. Along the upstream face of the bridge, a major pipeline is supported by cantilevers, as shown in Figure 2.11. The span is approximately 80 ft with a single continuous pier; however, the existing ground blocks much of the cross section below the bridge deck. The existing bridge is retained under all project scenarios. The channel modifications proposed in this reach for Alternatives 2A/d and 2B/d include an access road on the overbank rather than within the channel. The design cross section under the bridge proceeds at 2H:1V from the outside of the span. The bridge is shown in the photograph below along with a typical with-project scenario showing the maximum excavated footprint extending vertically down from the edge of the bridge deck and requiring some shoring to protect the bridge abutments. The existing bridge is retained under all project alternatives.

In conjunction with the proposed channel excavation, the bridge passes the required channel flow using the existing deck and soffit heights. The depth and configuration of the existing foundation is unknown, and shoring or other stabilization of existing abutments is assumed to be required. Conservative estimates of the required materials have been included in the cost estimate.

Figure 2.11 Schematic View of Yosemite Drive Bridge Modifications

2.3.8 Los Coches Street Bridge

The Los Coches Street Bridge carries two lanes of traffic over a trapezoidal cross section with a single continuous pier at the center. The left side of the channel is concrete, and the right side of the channel is earthen. The Arroyo de los Coches tributary enters at the upstream face on the right bank.

The existing structure allows sufficient conveyance to accommodate Alternative 2A/d, provided the channel walls are tied into the existing structure. For Alternatives 2B/d and 4/d, complete replacement of the Los Coches Street Bridge with a 100-foot open, raised span would be required to provide the required conveyance capacity. Any modifications in the upstream channel would also necessitate reconstructing the Arroyo de los Coches confluence area. In addition, the existing pedestrian bridge cantilevered on the upstream face would need to be reconstructed, and some rerouting of the bicycle path may be required. Raising the deck requires extensive roadway work. The actual height of the existing deck is unknown and should be verified, as the original hydraulic survey data show a solid deck that appears to include the bridge rails.

Figure 2.12 Schematic View of Los Coches Street Bridge Replacement for Alt 2B/d

2.3.9 Calaveras Boulevard Bridge

The Calaveras Boulevard Bridge is an 8-lane divided roadway. The crossing comprises four 8-ft high x 11-ft wide culvert barrels. Figure 2.13 shows the crossing along with a schematic view of the replacement scenario. The outer two barrels are partially filled with the earthen sideslope that projects to the outside toe of the middle culvert barrels. Debris has accumulated to a depth of 1-2 ft within the inner two barrels. It is assumed that the apparent reverse grade through the culvert barrel is a result of deposition or survey error, and that the actual concrete invert is at a flat or downstream slope. The existing bridge provides sufficient conveyance to accommodate Alternative 2A/d, provided the sediment in the outer barrels is excavated and the channel walls are tied into the existing structure. In order to provide the necessary conveyance capacity for Alternatives 2B/d and 4/d, the culvert barrels would need to be replaced by a 100-ft open span bridge. The bridge soffit would need to be raised several feet; however, an arched bridge or other configuration with a similar effective conveyance area may also be acceptable. The sideslopes would be 2H:1V to match the excavated channel footprint for Alternative 2B/d, and vertical abutments would be needed for Alternative 4/d. The downstream project is assumed to be constructed prior to the initiation of any of the project alternatives under consideration. The downstream project extends to the existing Calaveras Boulevard Bridge but does not include modifications to the structure itself; as such, the project improvements under Alternatives 2B/d and 4/d include a transition to match the downstream project approximately 50 ft downstream of Calaveras Boulevard Bridge.

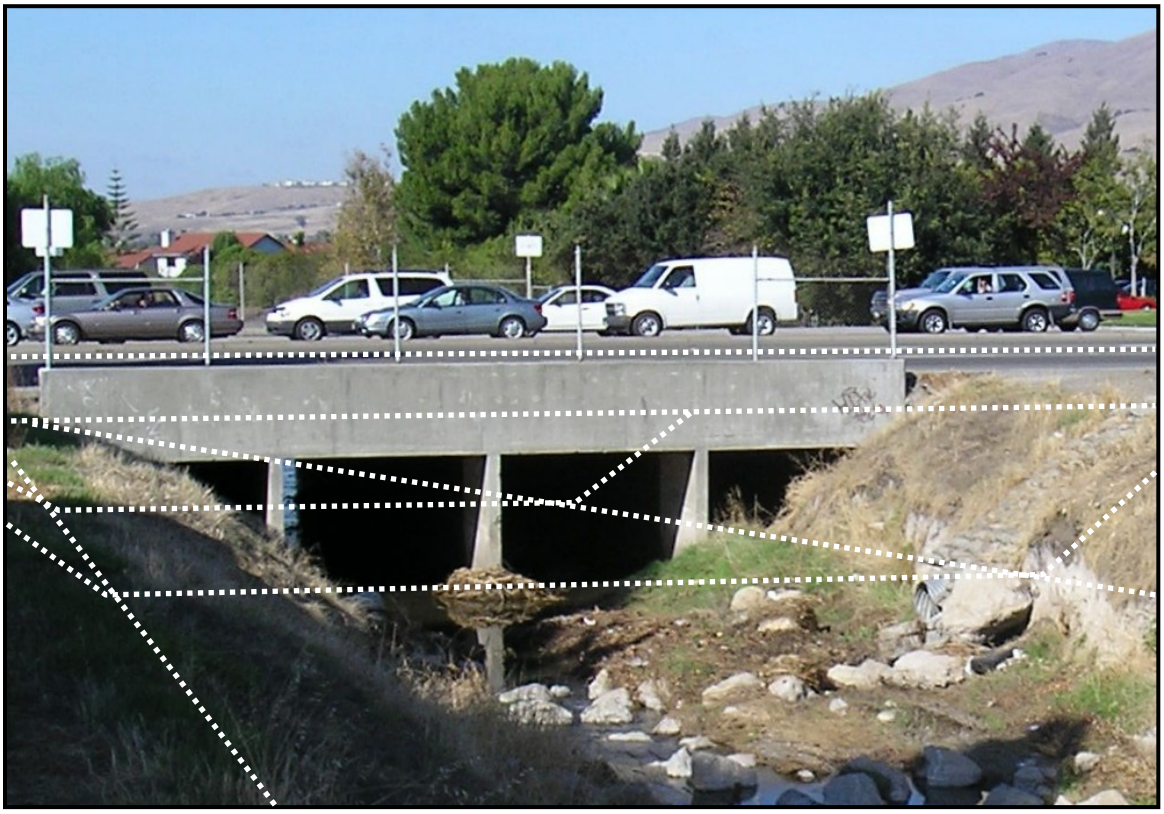


Figure 2.13 Schematic View of Calaveras Boulevard Bridge Replacement for Alt 2B/d

CHAPTER 3: COST ESTIMATES

3.1 Quantities

This chapter outlines the assumptions used in generating construction quantities for the project alternatives.

3.1.1 Bridges and Culverts

Concrete walls for replacement culverts are assumed to be 12" thick, and reinforcing steel is assumed at 200 lbs/cy. Standard wingwalls and headwalls are assumed for replacement bridges and culverts. Customized, cast-in-place wingwalls are assumed for modified bridges and culverts. All bridge and culvert resizing assumes that complete maintenance (sediment and debris removal) is performed periodically at the crossings to maintain the as-built, with-project condition. Wingwall and headwall extensions at modified bridges and culverts assume partial demolition of bridge rails and preparation of the existing headwall for doweling into the surface. Transition structures (with variably sloping wingwalls) are assumed to extend for 50-75 ft upstream or downstream of the bridge face. Where applicable, the maintenance road transitions out of the channel and over floodwalls to meet existing grade at each roadway crossing.

All bridge replacement scenarios assume 2:1 temporary sideslopes for structural excavation and backfill. Pavement, curb and gutter demolition and reconstruction likewise assumes a footprint based on 2:1 temporary sideslopes. Traffic lanes are assumed to require replacement only to their existing level of service. Bridge construction includes foundations, abutments, and approach slabs. Design plans from the GDM study were used as the basis for resizing the upstream UPRR trestle (1993). Though the modeled inverts differ from the design plans, the general channel shape from the plans was used in modeling the proposed replacement bridge.

3.1.2 Channels

All channel excavation and fill placement is assumed to be at 2:1 H:V sideslopes or milder. Channel excavation was modeled using the HEC-RAS channel modification function, as described in *Appendix B, Part I: Hydraulic Analysis of Alternatives*; excavation quantities in the cost estimate are based on end-area computations from HEC-RAS cross sections. Levee top widths (applied to any fill placement along the channel banks) are assumed to be a minimum of 12 ft wide. Where the top of the levee serves as the primary access road, an 18-ft minimum width is assumed. Where the top of the levee serves as the secondary access road, a 12-ft minimum width is assumed. Vertical concrete floodwalls are required as described in Chapter 2. Concrete floodwalls assume 42-inch safety railing would be required for any wall heights above 2 feet. Traffic barriers are assumed for portions of Berryessa Creek running parallel to roadways. A minimum toedown of 3 ft is assumed for riprap toe protection and concrete footer walls. Buried riprap toe protection is assumed to proceed up to 3 ft vertically up the sideslopes. Riprap is assumed at 12-inch D_{50} with a minimum thickness of 24 inches. A cellular confinement system or similar type of bank stabilization allowing the

growth of grass on the sideslopes is assumed for channel excavation and fill areas above the riprap toe protection.

Levee and floodwall heights are designed according to risk and uncertainty principles as described in the hydraulic appendix. All channel fill above existing ground will be designed according to the standards set forth in *EM 1110-2-1913 Design and Construction of Levees*. Stability of all sideslopes will be verified according to *EM 1110-2-1902 Slope Stability*. An obstruction-free zone is assumed adjacent to floodwalls or tops of earthen slopes. Gradation, compaction, and other parameters will be specified based on the results of geotechnical investigations. The suitability of reusing excavated material as fill will likewise be investigated further as the design process proceeds and as geotechnical investigations are completed. Planting is assumed on sloped banks and terraces, but not along the channel bed or within the low flow channel banks. No tree planting is considered on levee slopes or channel slopes.

Concrete walls are assumed to be 12" thick. Free-standing floodwalls assume subsurface concrete accounts for 60% of the total concrete volume. Shoring or stabilization allowing temporary cut slopes of 1:1 is assumed to allow placement of base slabs within the available right-of-way.

3.1.3 Operation, Maintenance, Rehabilitation, and Repair

Annual inspections of vegetation, bridges, culverts, and channel reaches are assumed throughout a 50-year project life. Vegetation control, partial vegetation replacement, sediment removal, and periodic structural maintenance are also assumed throughout the project life. Irrigation is assumed during the establishment period of approximately 5 years for slope plantings and throughout the project life for floodplain benches. The initial establishment of vegetation is assumed to be included in the unit cost of original construction. Since 1977, and annual average of approximately 7,000 cubic yards of sediment and debris has been removed from Berryessa Creek upstream of Calaveras Blvd. Table 2-1 in the Geomorphic and Sediment Transport Appendix shows the estimated maintenance quantities for historical removal of existing debris and repair of local scour areas; results are presented for each year, and these approximate removal quantities are assumed to reflect with-project maintenance efforts.

3.1.4 Cultural Resources

Existing cultural resource sites are known to exist within the project. The cost of data recovery as a fully Federal expense in compliance with the Archeological and Historic Preservation Act of 1974 (Public Law 93-291) would be limited to 1% of the total amount authorized to be appropriated for the project. The Sacramento District Cultural Resource section was consulted as to the adequacy of such an estimate and determined it to be a reasonable approximation for the cost of data recovery efforts. Other costs related to surveying, testing, and evaluation of the site are unlikely and have been included in the cost estimate as an appropriate contingency via the cost and schedule risk analysis.

3.1.5 Traffic Control

The assumed closure times associated with bridge and culvert modifications and replacements are presented in the accompanying traffic analysis (under separate cover).

3.1.6 Summary of Construction Quantities

Table 3.1 shows a summary of selected construction quantities.

Table 3.1 Summary of Construction Quantities

Material	Alternative		
	2A/d	2B/d	4/d
Demo & reconstruct pavement, curb & gutter (sf)	0	29,000	29,000
Cast-in-place concrete (cy)	1,000	12,000	32,000
Reinforcing steel (ton)	100	1,200	3,200
Excavate and Haul (cy)	46,000	61,000	86,000
Cellular confinement (sf)	170,000	134,000	0
Geotextile (sy)	33,000	49,000	27,000
Riprap (ton)	25,000	28,000	16,000
Planting - bank slopes (ac)	10	15	4
Planting - floodplain terraces (ac)	0	0	9

3.2 Unit Costs

Table 3.2 summarizes the unit costs and assumptions used in the cost estimate. Unit costs presented include labor and materials, with contractor overhead and profit included. Unit costs do not include contingency or other markups that are subsequently added to the construction subtotal.

Contingencies apply to construction costs only and not to markups. Unit costs for operation and maintenance include all markups.

Table 3.2 Summary of Unit Costs (Values from April 2009 Report)

Item	Unit Cost	Comments / Assumptions
Demolition		
Demo, haul, and dispose concrete	$120/cy	Assumes 5 mile haul to Guadalupe disposal site (Newby Island Recycling) – demo and transport only, no material cost, assume market for purchase
Demo, haul, and dispose pavement curb & gutter	$7/sf	Assumes 5 mile haul to disposal/recycling site – demo and transport only, no material cost, assume market for purchase
Demo, haul, and dispose CMP pipe culvert	$25/lf	Assumes 5 mile haul to disposal/recycling site – demo and transport only, no material cost, market for purchase
Demo, haul, and dispose timber	$8/bf	Assume no creosote
Demo, haul, and dispose rails	$110/tf	Assume recycling, market for purchase
Demo and relocate rails	$300/tf	Assume shift onsite or raise on levee for add'l row alt only
Earthwork		
Earthwork - excavate and haul	$25/cy	Excess only, assume temporary stockpile and 5 mile haul to disposal site, no treatment for contamination, assume market for purchase
Earthwork - place and compact fill	$25/cy	Assumes all material available onsite from excess, temporary stockpile

Item	Unit Cost	Comments / Assumptions
Earthwork - excavate and regrade onsite	$15/cy	Includes channel shaping and compaction without stockpiling (no net import or disposal)
Earthwork - excavate, backfill and compact	$50/cy	Excavation, temporary shoring, and backfill for structural earthwork, including bedding material
Concrete/Steel		
Cast-in-place concrete for floodwalls	$750/cy	Cantilevers (floodwalls), assume temporary shoring included for floodwall excavation. 6' base slab, 2' cutoff wall 3' below adjacent EG
Cast-in-place concrete for bridges and culverts	$750/cy	Includes foundations, abutments, approach slabs, not wingwalls or headwalls, not applied to pedestrian bridge
Safety railing	$30/lf	42" high standard double steel tube rail
Concrete traffic barrier	$50/lf	Standard jersey barrier
Reinforcing steel	$2.00/lb	Assume ~100 lb/cy
Articulated revetment	$20/sf	8" thick with openings for vegetation, not including filter or earthwork/compaction
Standard wingwalls	$10,000 ea	10' high x 20' length, including foundation
Standard headwalls	$10,000 ea	2' high, max 40' length, sealed Jersey barrier type or precast, tied to wingwalls
Custom wingwalls/transition structures	$25,000 - $50,000 ea	50'-75' length, 10' high, transition from vertical to 2:1, 3' toedown, includes maintenance access transition
Headwall extension	$50,000 ea	18" headwall extension, assume ~50' length
Rail installation	$350/tf	Includes ties, rails, and bedding
Roadway subgrade	$40/cy	18" aggregate base course subgrade for access road
Access road surfacing	$8sf	Compacted aggregate, mixed grading
Repave roadway and replace curb and gutter	$12/sf	Replace to same level of service as existing; includes all agg base, resurfacing, formwork, striping, inductor loops, etc.
Sheet piling	$80/sf	Assume trapezoidal 1/4" interlocking Z-pile
Fabric, Rock, and Planting		
Geotextile	$6/sy	Assume 2' key-in either side, underlies riprap and articulated revetment
Cellular Confinement	$4/sf	Includes honeycomb material and installation with fill material, planting separate
Import and place riprap	$90/ton	12" D_{50}, angular, toe protection and local maintenance, 3' toedown, 2' thick layer, source within 12 miles
Planting – grasses and hydroseed	$12,000/ac	Includes prep work and 1st year warranty
Planting – floodplain terraces	$35,000/ac	Includes prep work and 1st year warranty. Type and density to be determined
Vegetation replacement	$500-2,500 / ac-yr	Higher during initial establishment period, lower during remaining project life
Clear & Grub	$10,000/ac	Prepare existing ground for levee fill placement, include construction footprint and staging areas
Rock for local O&M repair	$300/ton	Includes all markups – applies to emergency bank repairs
Sediment removal	$75/cy	Includes all markups – based on SCVWD records
Other Costs and Assumptions		

Item	Unit Cost	Comments / Assumptions
Periodic inspections	$10,000/yr	Includes vegetation, bridge/culvert, and channel inspections
Utilities	varies	See details by feature
Mob/Demob	5%	Approximate percentage based on construction subtotal. Assume staging areas available as shown in plans
Cultural Resources	1%	Approximate percentage based on construction subtotal
Dewater	$250,000	Dewatering/diversion during construction
Traffic Control	$800,000	Maintain traffic during construction at major arterials, 30-day closure assumed at secondary bridge replacements.
Contingency	30%	Based on high uncertainty
Design Phase/PED	15%	Assumes planning at ~50% complete, high complexity due to multiple project features
Construction Inspection, S&A	8%	Not including contractor cost
Federal Share	50%-65%	Not including maintenance
LERRD	varies	Based on Corps real estate appraisal, acquisition only, breakdown of abutment, utility costs, etc. for distribution to LERRDS to be determined during cost-share apportionment.
Project Life	50 yrs	Assume periodic replacement/maintenance
Interest Rate	4.000%	Subject to change according to Federal direction

3.3 Cost Summary

Table 3.3 shows a summary of the total construction costs.

Table 3.3 Summary of Construction Cost by Alternative ($1,000)

Item	Alternative			
	2A/d	2B/d	4/d	5
Construction subtotal	$9,216	$25,969	$45,656	$25,890
Total First Cost	$24,675	$51,283	$85,603	$86,561
Present Value with O&M	$26,030	$52,972	$87,520	$89,314
Bridge/utility costs to be distributed to LERRD	$2,367	$20,290	$20,290	$5,529

Further details showing the construction cost of each feature are shown in Table 3.4. A detailed breakdown of individual line item costs can be found in the accompanying electronic spreadsheet.

Table 3.4 Feature Cost Summary for Project Alternatives

Reach/Structure	Type	Alternative 2A/d		Alternative 2B/d		Alternative 4/d		Alternative 5	
		Line Item	Reach Total	Line Item	Reach Total	Line Item	Reach Total	Line Item	Reach Total
General Items		$1,254,000		$2,848,000		$3,885,000		$ 2,450,000	
I-680	Bridge	$ 3,075		$ 3,075		$ 3,075		$ 1,490	
I-680 to Montague	Channel	$1,338,362		$3,246,430		$8,912,100		$ 4,390,703	
Montague Expressway	Bridge	$ 3,750		$3,201,550		$3,201,550		$ 1,040,751	
Montague to UPRR Trestle	Channel	$ 248,926		$ 269,555		$1,165,309		$ 510,359	
Railroad Trestle	Bridge	$1,072,200		$1,077,200		$1,077,200		$ 1,190,522	
UPRR Trestle to Culvert	Channel	$ 742,196		$ 749,484		$4,878,264		$ 2,324,973	
Railroad Culvert	Bridge	$ 1,500		$1,464,200		$1,464,200		$ 105,750	
UPRR Culvert to Ames	Channel	$ 176,523	$ 9,215,695	$ 207,476	$ 25,969,253	$1,044,721	$ 45,656,081	$ 503,879	$18,495,545
Ames	Bridge	$ 230,500		$ 236,500		$ 236,500		$ 120,750	
Ames to Yosemite	Channel	$ 477,903		$ 594,769		$3,026,940		$ 1,474,873	
Yosemite	Bridge	$ 230,500		$ 236,500		$ 236,500		$ 120,750	
Yosemite to Los Coches	Channel	$2,664,217		$3,862,694		$7,938,212		$ 3,086,919	
Los Coches	Bridge	$ 1,875		$2,187,625		$2,187,625		$ 112,380	
Los Coches to Calaveras	Channel	$ 687,926		$ 850,414		$1,394,219		$ 645,696	
Calaveras Blvd	Bridge	$ 3,750		$4,854,750		$4,854,750		$ 110,750	
Downstream of Calaveras	Channel	$ 78,491		$ 79,031		$ 149,916		$ 305,000	
Bridge/utility costs to be distributed to LERRD			$ 1,547,150		$ 13,261,400		$ 13,261,400		$ 3,613,894
Bridge/utility costs (w/ markup for conting, PED,SA)			$ 2,367,140		$ 20,289,942		$ 20,289,942		$ 5,529,258
Subtotal Upstream of I-680									$ 7,394,131
Subtotal Construction Cost			$ 9,215,695		$ 25,969,253		$ 45,656,081		$25,889,676
Real Estate (investigations+acquisition)			$ 10,575,000		$ 11,550,000		$ 15,750,000		$46,950,000
Total First Cost w/ markup for conting, PED, SA, LERRD)			$ 24,675,013		$ 51,282,956		$ 85,603,805		$86,561,205
Total Present Value (including O&M)			$ 26,029,909		$ 52,971,668		$ 87,519,915		$89,313,961

CHAPTER 4: INCIDENTAL RECREATION FEATURES

4.1 Features

While the Berryessa Creek project is a flood control project in terms of the project purpose and justification, the constructed features may also provide some opportunity to achieve incidental recreational benefits. A 15-foot wide obstruction-free zone provides access for maintenance, inspection, and flood-fighting purposes along both sides of the channel throughout the entire project reach. The obstruction-free zone must be kept free of vegetation and any other obstructions per Corps requirements for levees and floodwalls; however, some recreational use may be accommodated within the obstruction-free zone without hindering the primary purposes.

The quantities and cost estimates in Chapters 2 and 3 of this appendix assume the roadway in the obstruction-free zone is surfaced with compacted backfill, in-situ material, or coarse aggregate. A review of the City of Milpitas' Master Trail Plan (Sokale/Landry Collaborative 1997) was conducted to determine the feasibility of locating a multi-use recreation trail within the obstruction-free zone. The City of Milpitas was consulted in comparing the project features in the current design with the Master Plan criteria, and it was determined that additional paving would be required to allow the obstruction-free zone to serve as a recreational trail and meet American Disability Act (ADA) requirements and City of Milpitas design criteria.

While the Master Plan generally recommends that a trail easement should include a 25-foot buffer between the trail and adjoining parcels, the 15-foot wide obstruction-free zone in the current design is bounded intermittently along the project reach by buildings, roadways, and other infrastructure that would preclude the presence of a buffer zone. While not optimal, a City of Milpitas representative has stated that the current design widths will be adequate to meet the minimum standards of a recreation trail.

Only the routes on the upper channel banks are being considered for the multi-use recreational trail; the in-channel maintenance roads will not be utilized as the ramps would not necessarily provide ADA compliance; as such, undercrossings and stream access points are not being considered as incremental recreational features. It is anticipated that pedestrians users of the recreational trails would utilize existing at-grade street crossings; due to the proximity of the project alignment to the Milpitas Boulevard intersections, the installation of an additional pedestrian or bicycle crossing with signaling, striping, and other requirements, is not considered feasible, particularly for the high traffic-volume routes such at Montague and Calaveras. Because there is currently no undercrossing at the I-680 Bridge, the proposed recreational trail extends only between Calaveras Boulevard and the Montague Expressway. Future improvements by others may connect the obstruction-free zones to the existing pedestrian bridge at I-680, allowing this reach to include a recreational trail; however, these features are considered beyond the scope of the current project.

The Master Plan cites that identity signs, use signs, safety signs, private property signs, interpretive and protective signs, and regional signs should be used to mark trails; however, the 15-foot obstruction-free zone must be free of any structures, which includes signage that might encroach on the available width. While some safety signage may be required by the project regardless of recreational use (near floodwalls, bridge crossings, or hydraulic structures, for example), any additional signage would need to be implemented by the non-Federal agency and would need to be placed in locations outside of the obstruction free-zone. It is assumed that access along Berryessa Creek would remain open as at present; supplemental safety fencing is not provided along the top of the sloping earthen channel banks as part of the project or recreational features.

Due to the limitations of the project area's obstruction-free zone for providing permanent facilities to trail users, existing regional staging areas (e.g., parks and public recreation facilities) should be utilized to provide potable and non-potable water and sanitary facilities. The 2-mile project reach allows these facilities to be located beyond the extents of the project while still meeting the Master Plan requirement of a 5-mile maximum spacing.

Several features that are typically recommended in conjunction with recreational trails in the Master Plan are not considered incidental recreational benefits. These non-incidental features are outside of the authorized project purpose. Adding this purpose to the Authorized Project would require additional authority from Congress, which would require a potentially lengthy process. However, these features could be added to the project as non-Federally funded betterments without additional Congressional authority.

4.2 Quantities

As shown in the attached plan view, the incidental recreational features include twenty access points, each with 2 benches and 2 signs. In addition, the obstruction-free zone includes 244,000 square feet of surface area that would need to be paved in order to meet the requirements listed above. Since the multi-use trail would also be used by equipment for sediment removal and other maintenance purposes, the pavement would need to meet strength and durability requirements for heavy equipment access, including cranes, dump trucks, and excavators. An additional base course of 4 inches is assumed, along with a 4-inch thick asphalt section.

4.3 Costs

The total incremental cost of the recreation items is $1,626,000. This cost includes contingency but does not include costs for the PED phase or construction management. This cost is not included in the total project cost as it falls outside the authorized project purpose.

4.4 Justification

Berryessa Creek runs through the cities of Milpitas and San Jose in Santa Clara County, California. The population of Milpitas and San Jose is 67,476 and 958,789, respectively (source: California Department of Finance, E-1 May 2011.) According to the 2000 Census data, there are over 60,000 residents within one mile of the trail. Expected recreational usage

would likely be similar to the current recreational use of the project downstream of Calaveras Boulevard. The study area is located in an urbanized alluvial plain that includes primarily commercial and industrial land uses with a small residential development located adjacent to Los Coches Street; the heaviest usage of the trail would be expected in the vicinity of this residential development.

Construction of recreation features as part of the Corps project will be dependent upon completion of a third-party agreement between SCVWD and the City of Milpitas regarding funding and maintenance of the recreation features.

CHAPTER 5: CONCLUSIONS

This part of the engineering appendix (*Appendix B, Part IV: Design and Cost of Alternatives*) presents the basis of civil design and cost parameters for the Upper Berryessa Creek Project. Assumptions underlying the cost estimate are presented, including estimated construction quantities and unit costs.

- *Quantities*. Construction quantities are based on the required measures for conveying the given flow profiles within cross sectional templates that vary by alternative.

- *Unit Costs*. Unit costs are based on the MCACES 2010 English Unit Cost Library, 2012 Santa Clara County Labor Library, 2009 Region VII Equipment Library, and individual vendor quotations. Costs taken from previous studies have been escalated as appropriate. MII estimates supersede the values presented in this appendix.

The following table summarizes the total first costs by alternative.

Table 5.1 Summary of Total First Costs by Alternative ($1,000)

Item	Alternative			
	2A/d	2B/d	4/d	5
Present Value with O&M	$24,675	$51,283	$85,604	$86,561

COST ENGINEERING REPORT

Berryessa Creek Flood Control
Santa Clara County, CA

COST ENGINEERING REPORT

August 26, 2013

TETRA TECH

TABLE OF CONTENTS

APPENDICES

****TOTAL PROJECT COST SUMMARY****

PREPARED: 8/26/2013

THIS ESTIMATE IS BASED ON THE SCOPE CONTAINED IN THE FINAL GRR REPORT, NED PLAN
PROJECT: Berryessa Creek Flood Control (P2 122247)
LOCATION: CALIFORNIA

U. S. ARMY CORPS OF ENGINEER, SACRAMENTO DISTRICT
P.O.C.: JEREMIAH A. FROST, CHIEF, COST ENGINEERING SECTION

WORK BREAKDOWN STRUCTURE		ESTIMATED COST				PROJECT FIRST COST (CONSTANT DOLLAR BASIS)				TOTAL PROJECT COST (FULLY FUNDED)				
		Estimate Prepared: 28-Mar-2013				PROGRAM YEAR(BUDGET EC): FY2013				SPENT THRU:				
		Effective Price Level: 1-Oct-2012				EFF. PRICE LEVEL DATE: 1-Oct-2012				1-Oct-2011				
		RISK BASED												FULLY
WBS NO.	Civil Works Feature\Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC. (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	COST ($K)	INFLATED (%)	COST ($K)	CNTG ($K)	FUNDED ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*	*M*	*N*	*O*
	Index Codes: 0 - no esc. applied; A - Administration; C - Combined indexes; All other codes used coincides with the Code of Accounts.													
	Contingency Applied To Remaining Cost Only													
	FEDERAL COSTS													
9	CHANNELS & CANALS	8,728	2,214	25	10,942	0.00	8,728	2,214	10,942	0	7.0	9,333	2,370	11,703
18	CULT. RESRC. PRESERV. (1	109	25	23	134		109	25	134	0		116	25	141
	SUBTOTAL FEDERAL & NON-FEDERAL CONSTRUCTION COSTS	8,837	2,239		11,076		8,837	2,239	11,076	0		9,449	2,395	11,844
30	PLAN/ENGINEERING/DESIGN	1,306	108	8	1,414	0.00	1,306	108	1,414	0	7.1	1,398	116	1,514
31	CONSTRUCTION MANAGE'MT	867	54	6	921	0.00	867	54	921	0	6.8	926	58	984
	SUBTOTAL FEDERAL & NON-FEDERAL CONTRIBUTION	11,010	2,401		13,411		11,010	2,401	13,411	0		11,773	2,569	14,342
	NON-FEDERAL CONTRIBUTION (-)	-1,083	-242		-1,325		-1,083	-242	-1,325	0		-1,145	-255	-1,400
	SUBTOTAL	9,927	2,159		12,086		9,927	2,159	12,086	0		10,628	2,314	12,942
	FEDERAL REIMBURSEMENT(+)	1,013	281		1,294		1,013	281	1,294	0		935	263	1,198
	TOTAL FEDERAL COSTS	**$10,940**	**$2,440**		**$13,380**		**$10,940**	**$2,440**	**$13,380**	**$0**		**$11,563**	**$2,577**	**$14,140**
	NON-FEDERAL COSTS													
1	LANDS AND DAMAGES	8,972	2,106	23	11,078	0.00	8,972	2,106	11,078	0	3.9	9,325	2,188	11,513
2	RELOCATIONS	1,391	319	23	1,710	0.00	1,391	319	1,710	0	6.9	1,487	341	1,828
30	PLAN/ENGINEERING/DESIGN	236	20	8	256	0.00	236	20	256	0	7.0	253	21	274
31	CONSTRUCTION MANAGE'MT	161	10	6	171	0.00	161	10	171	0	7.0	172	11	183
	SUBTOTAL NON-FEDERAL	10,760	2,455		13,215		10,760	2,455	13,215	0		11,237	2,561	13,798
	NON-FEDERAL CONTRIBUTION (+)	1,083	242		1,325		1,083	242	1,325	0		1,145	255	1,400
	SUBTOTAL	11,843	2,697		14,540		11,843	2,697	14,540	0		12,382	2,816	15,198
	FEDERAL REIMBURSEMENT(-)	-1,013	-281		-1,294		-1,013	-281	-1,294	0		-935	-263	-1,198
	TOTAL NON-FEDERAL COSTS	**$10,830**	**$2,416**		**$13,246**		**$10,830**	**$2,416**	**$13,246**	**$0**		**$11,447**	**$2,553**	**$14,000**
	TOTAL FEDERAL & NON-FEDERAL COSTS	**$21,770**	**$4,856**		**$26,626**		**$21,770**	**$4,856**	**$26,626**	**$0**		**$23,010**	**$5,130**	**$28,140**

_____ **CHIEF, COST ENGINEERING**

_____ **PROJECT MANAGER**

_____ **CHIEF, REAL ESTATE**

ESTIMATED FEDERAL COST: **$14,140**
ESTIMATED NON-FEDERAL COST: **$14,000**

ESTIMATED TOTAL PROJECT COST: **$28,140**

GENERAL NOTES

(1 Cultural Resources Preservation costs associated with mitigation and/or data recovery up to one percent of the total Federal cost are not subject to cost sharing.
(2 The Fully Funded cost estimate was prepared in compliance with Indexes used from CWCCIS reflecting OMB future rates Mar. 31 ,2012.
(3 01 Account for Land and Damages cost are from Real Estates.

CONTINGENCY RATIONALE

(A CONTINGENCIES USED WAS DERIVED BY THE COST SCHEDULE RISK ANALYSIS PROCESS AND IS BASED ON A 80% CONFIDENCE LEVEL.

BERRYESSA CREEK FLOOD CONTROL

COST ESTIMATE NARRATIVE

1. Project Description

A. General: This work is in support of the conceptual design of flood control improvements along a section of Berryessa Creek that runs through San Jose and Milpitas, CA. The construction would consist of modifying the channel downstream of the I-680 Bridge to consist of an earthen trapezoidal shape. Earthen levees would also be constructed and the levees are designed to contain the 0.01 exceedance probability event discharges.

B. Purpose: The purpose of this work is to develop detailed cost estimates – consistent to the level of design – for the cost and quantities of the construction features using Micro-Computer Aided Cost Estimating System (MCACES).

C. Design Features: Construction features include earthwork; riprap; geotextile and cellular confinement systems; cast-in-place concrete, demolition and replacement of railroad; sheet piling; seeding; and roadway surfacing.

2. Basis of Estimate

a. Basis of Design: Available design documents of the project elements are listed below. The project site plan is presented in Appendix A.

- Berryessa Creek Project, Draft General Reevaluation Report and Environmental Impact Statement, Prepared by Tetra Tech, October, 2011
- Berryessa Creek Project General Reevaluation Study, Plan and Profile Drawings, Prepared by Tetra Tech

A. Basis of Quantities: The cost estimate is based on project quantity take-offs that have been calculated from the documents listed above. A quantity summary along with detailed quantity take-offs are presented in Appendix B. The detailed quantities include waste/loss factors for the project materials as listed below:

Soil Swell/Shrinkage Factor	15%
Riprap Overplace	15%
Geotextile Fabric Waste	5%
Concrete Overplace	10%
Asphalt Overplace	10%

3. Construction Schedule

It is estimated that overall construction would take approximately 23 months to construct. This duration has been used in the estimate to determine costs for the contractor to maintain field facilities and construction supervision. A simplified tentative construction

schedule of the overall project is presented in Appendix C. The overall schedule is based on the following reasoning and assumptions:

- Typical construction, crew (1 shift) working 8 hrs per day and 5 days per week.
- Construction progression would be from upstream to downstream by reach.
- It is assumed that construction could progress straight through the "wet months" because, at this level of design and analysis and based on the designer's opinion, it appears that there would not be a significant amount of water passing through the channel to require a stoppage of work for several months.

4. Acquisition Plan

The cost estimate is based on a single contract being awarded for all the construction components. The estimate also assumes that the Prime Contractor would hire subcontractors for the vegetative aspects, concrete placing, pile driving, asphalt and railroad aspects of the project. The prime contractor would be responsible for the preparatory work, channel excavation, and all other associated site work as well as overseeing the subcontractors' work on the landscaping, pile driving, concrete, asphalt and railroad work.

5. Project Construction

A. Staging and Site Access: Each reach would have its own staging and site access areas. They would be located in an appropriate area designated on the design drawings.

B. Borrow/Disposal Areas and Materials: The borrow materials for placement of riprap, aggregate base, and ballast rock are available nearby and would be trucked in from the quarry site.

   The materials required for the cast-in-place concrete mixes including cement, coarse aggregate, fine aggregate, and various admixtures would be locally available.

   All materials that need to be disposed of off-site are assumed to be loaded and hauled to the Newby Island Sanitary Landfill which is located in Milpitas, CA. This landfill is located approximately 5-miles from the project site. This landfill would be able to take in the excess excavated material as well as any demolished material that would be removed during construction.

C. Construction Methodology:

   The construction would be performed by reach. There are a total of 16 reaches, with 8 of the reaches being the channel work, and 8 reaches being performed under or near overpass structures. The different construction components are as follows:

   - Relocations – There are various utilities that run through the project site. The utilities would need to be relocated prior to the primary construction items being performed. However, clearing and grubbing would need to occur before the utility relocations can take place. The types of utilities in question include underground electric cables, piping, outlet structures and overhead lines. For the underground cables and pipes, the estimate assumes digging these items up and replacing them. The new materials would be placed at a greater depth in order to avoid the channel improvement work. The outlet

structures are assumed to be demolished, and replaced once construction is complete. It is assumed that no aspect of the relocations would occur outside of the right of way limits shown on the design plans, as well as no relocations would occur at the bridges.

- Dewatering – It has been estimated that there would be five dewatering phases that incorporate multiple reaches at a time. Earthen cofferdams would be constructed at the upstream and downstream section of the reaches under construction. The dams would consist of on-site excavated material, and would be covered with a water proof liner. Dewatering pumps and a diversion pipe would be placed to dewater the channel, and maintain dry conditions for the duration of construction. At the current level of design, it is assumed only surface water would be encountered during construction. The diversion pipe would be purchased to construct the first reaches, and then re-used on the later constructed reaches. Once the construction for the dewatered channel is complete, the upstream cofferdam would be removed and replaced downstream of the remaining cofferdam in order to dewater the next reaches to be constructed.
- Clearing and Grubbing – The entire channel area would require clearing and grubbing prior to construction. Clearing and grubbing would be performed with a crew using chainsaws and a dozer.
- Excavate and Haul – The construction of the channel requires material to be excavated and hauled off-site for disposal. The estimate assumes a hydraulic excavator would be used to remove and stockpile the material. A loader would then load the trucks, which are assumed to be 16-cy dump trucks. The trucks are assumed to travel 5-miles to the dump the materials.
- Place and Compact Fill – This item includes the filling and compacting of on-site material. The material would have come from previous excavation. The backfill would be performed with a front end loader. The compaction would be performed with a vibratory roller along with a water truck to prevent dust ups.
- Import and Place Riprap – Some of the channel banks would require riprap slope protection. The riprap is assumed to be trucked into the project site from a local quarry. The rock would then be placed with a hydraulic excavator.
- Geotextile Fabric – Geotextile fabric is required in various reaches throughout the project. The fabric would be placed using a crane and crew.
- Cellular Confinement System – Some reaches require a cellular confinement system for erosion protection. The confinement system would be placed using the same crane crew as the geotextile fabric.
- Cast-In-Place Concrete – An approximately 2-feet high retaining wall would be constructed in several reaches. This wall would include steel reinforcing and would be pumped and placed by a sub-contractor.

- Planting – All planting for this project is assumed to be seeding. The seed material would be installed by mechanical methods, and the work is assumed to be handled by a sub-contractor.
- Temporary Shoo-Fly Structure – A railroad line runs through the channel in Reach 5. A temporary shoo-fly structure would be constructed to allow for the replacement of the current wood trestle that supports the existing rails. An earthen berm would be constructed to support the temporary rails. New ballast rock, rails and ties would run over the berm and connect to the existing rails outside the channel. Once the new structure is constructed the temporary rails and berm would be removed.
- Demo, Haul, and Dispose Rails – The existing railroad line on top of the existing wood trestle would need to be removed. The rails, ballast and ties would be demolished, and then hauled off site for disposal.
- Demo, Haul, and Dispose Timber – The existing wood trestle would need to be removed. The entire timber structure would be demolished and hauled off site for disposal.
- Construct Replacement Culvert – After the removal of the existing railroad trestle, a triple box culvert would be installed. The culvert would have openings of approximately 10-ft x 11-ft. The concrete would be cast-in-place and would include steel reinforcing. The concrete is assumed to be pumped and placed by a sub-contractor.
- Reconstruct Rails and Ties – The railroad would need to be re-built on top of the new triple box culvert. New ballast rock would be brought in, along with new primary rails and wooden ties. The estimate assumes that the work would be performed by a sub-contractor.
- Sheet Piling – At a couple bridge locations sheet piling would be installed to protect some of the structures. The estimate assumes that the sheet piles would be PZ-27 type piles. They would be driven into place by a sub-contractor.
- Roadway Base – An aggregate base layer would be placed beneath an access road in several reaches. The aggregate base material is assumed to be trucked to the project site and then placed by a front end loader and grader.
- Access Road Surface – An asphalt access road would be constructed in several reaches. The road is assumed to be placed by a sub-contractor.
- Recreation – An asphalt concrete trail would be constructed along both banks of the channel. The trail would run approximately from Calaveras Blvd to Montague Expressway. This trail would be 15-feet wide and would require an aggregate base layer. Various access points would be required as well, and at these points benches and signs would be installed.

D. Unusual Conditions: (Soil, Water, Weather, Traffic). Flooding within the creek, seasonally variation in groundwater depths, varying bedrock elevations, poor soil conditions, and traffic may occur.

E. Unique Construction Techniques: Mostly in dry creek bed with possible shallow groundwater. Pile driving equipment would be necessary for the sheet pile placement.

F. Equipment/Labor Availability and Distance Traveled: All equipment and labor should be available in the greater Bay Area.

6. Environmental Concerns

Construction activities would likely increase turbidity in the creek. There is a potential for construction equipment to leak or spill contaminates into the creek and or damage existing plant and wildlife. However, costs to mitigate these issues would be included in the contractors spill prevention plan required for construction.

7. Effective Dates for Labor, Equipment and Material Pricing

The labor, equipment, and material pricing were developed using the MCACES 2010 English Unit Cost Library, 2012 Santa Clara County Labor Library, and the 2009 Equipment Library (Region VII) for the base cost estimates. The index pricing data has been prepared in July 2012 dollars.

The base cost estimates have been updated with current quoted fuel prices of $3.52/gal for off-road diesel, $4.19/gal for on-road diesel and $3.67/gal for gasoline in the Milpitas area.

8. Estimated Production Rates

Much of the construction cost estimate was developed utilizing user defined crews and production rates. See Appendix E for the Estimated Production Rates developed for this estimate.

9. Project Markups

A. Escalation: Escalation has been calculated within the Total Project Cost Summary. Price levels have been escalated from effective price levels of the construction cost estimate for July 2012 to the mid-point of construction. The appropriate escalation cost factors for each date for each feature account have been calculated within the TPCS.

B. Contingency: A 22.45% contingency has been included in the estimate for the Relocations, Channels & Canals, and Recreation accounts. Planning, Engineering and Design has an 8.33% contingency, and Construction Management has an 6.25% contingency. An abbreviated Cost and Schedule Risk Analysis (CSRA) has been performed to calculate the contingencies listed above. The abbreviated CSRA can be seen in Appendix G.

10. Functional Costs

Functional costs associated with this work were estimated as follows:

A. 01 Account – Lands and Damages: Costs for lands and damages were provided by the USACE, Sacramento District Real Estate Division. The costs came out of the Berryessa creek Flood Control Project, Real Estate Plan Report, which is dated July 17, 2012. The

lands and damages cost entered in the Total Project Cost Summary already includes contingency, and therefore no contingency is applied to the cost in the summary.

B. 02 Account – Relocations: Costs for this account have been estimated within the MII estimate. Costs include excavation, demolition and relocation to a greater depth of the existing utilities that are impacted by construction and are considered compensible.

C. 18 Account – Cultural Resources: Costs for this account have been estimated at $141k for data recovery as provided by cultural section. This account covers the possibility of finding cultural significant items during construction.

D. 30 Account - Planning, Engineering, and Design: Costs for this account were estimated at 15.0% of the construction cost. This account covers the preparation of plans, and specifications.

E. 31 Account - Construction Management: Costs for this account were estimated to be 10.0% of the construction cost. This account covers construction management during construction.

11. MCACES Construction Cost Estimate

The construction cost estimate was developed using MCACES 2nd Generation (MII) estimating software in accordance with guidance contained in ER 1110-2-1302, Civil Works Cost Engineering. The MII cost estimate has only been developed to include the Relocations and Channels feature accounts. See Appendix G for the MII output report.

12. Total Project Cost Summary (TPCS)

The TPCS was prepared using the latest TPCS excel spreadsheet provided by the USACE, Walla Walla District. The TPCS incorporates the construction costs developed in the MII, the project markups, and the functional costs.

13. References

U.S. Army Corps of Engineers, 1993, *Engineering and Design Cost Engineering Policy and General Requirements, Engineering Regulation 1110-1-1300,* Department of the Army, Washington D.C., 26 March 1993.

U.S. Army Corps of Engineers, 1999, *Engineering and Design For Civil Works Projects, Engineering Regulation 1110-2-1150,* Department of the Army, Washington D.C., 31 August 1999.

U.S. Army Corps of Engineers, 2008a, *Civil Works Cost Engineering, Engineering Regulation 1110-2-1302,* Department of the Army, Washington D.C., 15 September 2008.

U.S. Army Corps of Engineers, 2008b, *Construction Cost Estimating Guide For Civil Works, Engineering Technical Letter 1110-2-573,* Department of the Army, Washington D.C., 30 September 2008.

U.S. Army Corps of Engineers, 2010, *Civil Works Construction Cost Index System, Engineering Manual 1110-2-1304,* Department of the Army, Washington D.C., 31 October 2011.

APPENDIX A

Site Plan

Site Plan


Calaveras Blvd.
Milpitas Blvd.
Yosemite Ave.
Berryessa Creek
Interstate 680
Landess Ave.
Morrill Ave.
Montague Expy.
Berryessa Creek
Cropley Ave.
Piedmont Rd.
1000 feet
250 m
Image courtesy of USGS © 2011 Microsoft Corporation
Pictometry Bird's Eye © 2010 Pictometry International Corp
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APPENDIX B

Project Quantities and Detailed Quantity Take-Offs

Berryessa Creek Work Breakdown Structure Quantities

MCACES Source Tag	Item Description	Waste/Loss Factor (%)	Unit of Measure	Quantity
[02]	**RELOCATIONS**	**-**	**LS**	**1**
[02 02]	**Reach 2**	**-**	**LS**	**1**
[02 02 01]	**12kv Underground Line - STA 233+00**	**-**	**LF**	**75**
[02 02 01 01]	**Demolition**	**-**	**LF**	**75**
	Pot Holing	-	HR	4
	Structural Excavation	-	CY	56
	Cable Demolition	-	LF	75
	Disconnect Both Ends of Cable	-	HR	8
[02 02 01 02]	**Relocation**	**-**	**LF**	**75**
	Structural Excavation	-	CY	93
	Trench Shoring	-	SF	1,050
	12kv Cable Installation	-	CLF	0.75
	Fill and Compact From Stockpile	-	CY	149
	Connect Both Ends of Cable	-	HR	8
[02 02 02]	**24" CMP Storm Drain - STA 226+00**	**-**	**LF**	**30**
[02 02 02 01]	**Demo Concrete Headwall and Pipe**	**-**	**LF**	**30**
	Demo Concrete Headwall	-	CF	36
	Structural Excavation	-	CY	22
	Demo 24" CMP	-	LF	30
	Backfill and Compact	-	CY	22
	Concrete Load and Haul	-	CY	16
	Tipping Fee, Reinforced Concrete	-	CY	2
[02 02 02 02]	**Replace Outlet Strcture**	**-**	**LF**	**30**
[02 02 02 02 01]	**RCP Placement**	**-**	**LF**	**30**
	Structural Excavation	-	CY	37
	Trench Shoring	-	SF	420
	Install 24" RCP	-	LF	30
	Install Flap Gate	-	EA	1
	Backfill and Compact	-	CY	37
[02 02 02 02 02]	**Concrete Headwall and Footing**	**-**	**CY**	**1.4**
	Concrete, Forms	-	SFC	85
	Concrete, Material	10%	CY	1.5
	Concrete, Placement	10%	CY	1.5
	Reinforcing Steel, Material	-	TON	210
	Reinforcing Steel, Placement	-	LBS	0.11
[09 02 02 02 03]	**Import and Place Riprap**	**-**	**TON**	**1.4**
	Rip Rap, Material	15%	TON	1.6
	Rip Rap, Placement	15%	TON	1.6
[02 02 03]	**350A Underground Line - STA 222+00**	**-**	**LF**	**140**
[02 02 03 01]	**Demolition**	**-**	**LF**	**140**
	Pot Holing	-	HR	4
	Structural Excavation	-	CY	104
	Cable Demolition	-	LF	140
	Disconnect Both Ends of Cable	-	HR	8
[02 02 03 02]	**Relocation**	**-**	**LF**	**140**
	Structural Excavation	-	CY	174
	350A Cable Installation	-	CLF	1.4
	Fill and Compact From Stockpile	-	CY	277
	Connect Both Ends of Cable	-	HR	8
[02 02 04]	**12kv Underground Line - STA 211+80**	**-**	**LF**	**280**
[02 02 04 01]	**Demolition**	**-**	**LF**	**280**
	Pot Holing	-	HR	4
	Structural Excavation	-	CY	207
	Cable Demolition	-	LF	280
	Disconnect Both Ends of Cable	-	HR	8
[02 02 04 02]	**Relocation**	**-**	**LF**	**280**
	Structural Excavation	-	CY	347

Berryessa Creek Work Breakdown Structure Quantities

MCACES Source Tag	Item Description	Waste/Loss Factor (%)	Unit of Measure	Quantity
	Trench Shoring	-	SF	3,920
	12kv Cable Installation	-	CLF	2.80
	Fill and Compact From Stockpile	-	CY	555
	Connect Both Ends of Cable	-	HR	8
[02 04]	**Reach 4**	**-**	**LS**	**1**
[02 04 01]	**12kv Underground Line - STA 208+40**	**-**	**LF**	**55**
[02 04 01 01]	**Demolition**	**-**	**LF**	**55**
	Pot Holing	-	HR	4
	Structural Excavation	-	CY	41
	Cable Demolition	-	LF	55
	Disconnect Both Ends of Cable	-	HR	8
[02 04 01 02]	**Relocation**	**-**	**LF**	**55**
	Structural Excavation	-	CY	68
	Trench Shoring	-	SF	770
	12kv Cable Installation	-	CLF	0.55
	Fill and Compact From Stockpile	-	CY	109
	Connect Both Ends of Cable	-	HR	8
[02 06]	**Reach 6**	**-**	**LS**	**1**
[02 06 01]	**12kv Underground Line - STA 205+80**	**-**	**LF**	**75**
[02 06 01 01]	**Demolition**	**-**	**LF**	**75**
	Pot Holing	-	HR	4
	Structural Excavation	-	CY	56
	Cable Demolition	-	LF	75
	Disconnect Both Ends of Cable	-	HR	8
[02 06 01 02]	**Relocation**	**-**	**LF**	**75**
	Structural Excavation	-	CY	93
	Trench Shoring	-	SF	1,050
	12kv Cable Installation	-	CLF	0.75
	Fill and Compact From Stockpile	-	CY	149
	Connect Both Ends of Cable	-	HR	8
[02 06 02]	**12kv Underground Line - STA 197+60**	**-**	**LF**	**60**
[02 06 02 01]	**Demolition**	**-**	**LF**	**60**
	Pot Holing	-	HR	4
	Structural Excavation	-	CY	44
	Cable Demolition	-	LF	60
	Disconnect Both Ends of Cable	-	HR	8
[02 06 02 02]	**Relocation**	**-**	**LF**	**60**
	Structural Excavation	-	CY	74
	Trench Shoring	-	SF	770
	12kv Cable Installation	-	CLF	0.60
	Fill and Compact From Stockpile	-	CY	119
	Connect Both Ends of Cable	-	HR	8
[02 08]	**Reach 8**	**-**	**LS**	**1**
[02 08 01]	**12" Waterlines**	**-**	**LF**	**75**
[02 08 01 01]	**Demolition**	**-**	**LF**	**75**
	Pot Holing	-	HR	4
	Structural Excavation	-	CY	201
	Pipe Demolition	-	LF	150
[02 08 01 02]	**Relocation**	**-**	**LF**	**75**
	Structural Excavation	-	CY	186
	Trench Shoring	-	SF	1,050
	12" RCP	-	LF	150
	Aggregate Base, Material	15%	TON	7.2
	Aggregate Base, Placement	15%	CY	4.8
	Pipe Test and Flush	-	HR	6
	Fill and Compact From Stockpile	-	CY	297
[02 08 02]	**30" RCP**	**-**	**LF**	**45**

Berryessa Creek Work Breakdown Structure Quantities

MCACES Source Tag	Item Description	Waste/Loss Factor (%)	Unit of Measure	Quantity
[02 08 02 01]	**Demolition**	**-**	**LF**	**45**
	Pot Holing	-	HR	4
	Structural Excavation	-	CY	42
	Pipe Demolition	-	LF	45
[02 08 02 02]	**Relocation**	**-**	**LF**	**45**
	Structural Excavation	-	CY	56
	Trench Shoring	-	SF	630
	30" RCP	-	LF	45
	Aggregate Base, Material	15%	TON	12.9
	Aggregate Base, Placement	15%	CY	8.6
	Pipe Test and Flush	-	HR	6
	Fill and Compact From Stockpile	-	CY	98
[02 12]	**Reach 12**	**-**	**LS**	**1**
[02 12 01]	**Telephone Conduit - STA 160+00**	**-**	**LF**	**200**
[02 12 01 01]	**Demolition**	**-**	**LF**	**200**
	Pot Holing	-	HR	4
	Structural Excavation	-	CY	148
	Conduit Demolition	-	LF	200
[02 12 01 02]	**Relocation**	**-**	**LF**	**200**
	Structural Excavation	-	CY	184
	Trench Shoring	-	SF	2,800
	Conduit Installation	-	CLF	2.00
	Fill and Compact From Stockpile	-	CY	332
[02 12 02]	**27" CMP - STA 154+00**	**-**	**LF**	**35**
[02 12 02 01]	**Demolition**	**-**	**LF**	**35**
	Pot Holing	-	HR	4
	Structural Excavation	-	CY	32
	Pipe Demolition	-	LF	35
[02 12 02 02]	**Relocation**	**-**	**LF**	**35**
	Structural Excavation	-	CY	50
	Trench Shoring	-	SF	490
	27" RCP	-	LF	35
	Aggregate Base, Material	15%	TON	10.1
	Aggregate Base, Placement	15%	CY	6.7
	Pipe Test and Flush	-	HR	6
	Fill and Compact From Stockpile	-	CY	82
[02 12 03]	**3-1/0A XLCJ 21kv - STA 151+00**	**-**	**LF**	**70**
[02 12 03 01]	**Demolition**	**-**	**LF**	**70**
	Pot Holing	-	HR	4
	Structural Excavation	-	CY	52
	Cable Demolition	-	LF	210
	Disconnect Both Ends of Cable	-	HR	24
[02 12 03 02]	**Relocation**	**-**	**LF**	**70**
	Structural Excavation	-	CY	100
	Trench Shoring	-	SF	980
	12kv Cable Installation	-	CLF	2.10
	Fill and Compact From Stockpile	-	CY	152
	Connect Both Ends of Cable	-	HR	24
[02 12 04]	**3-700A and 1-350A Underground - STA 149+20**	**-**	**LF**	**160**
[02 12 04 01]	**Demolition**	**-**	**LF**	**160**
	Pot Holing	-	HR	4
	Structural Excavation	-	CY	119
	Cable Demolition	-	LF	640
	Disconnect Both Ends of Cable	-	HR	32
[02 12 04 02]	**Relocation**	**-**	**LF**	**160**
	Structural Excavation	-	CY	228
	Trench Shoring	-	SF	2,240

Berryessa Creek Work Breakdown Structure Quantities

MCACES Source Tag	Item Description	Waste/Loss Factor (%)	Unit of Measure	Quantity
	12kv Cable Installation	-	CLF	6.40
	Fill and Compact From Stockpile	-	CY	347
	Connect Both Ends of Cable	-	HR	32
[02 12 05]	**12kv Underground Line - STA 138+60**	**-**	**LF**	**550**
[02 12 05 01]	**Demolition**	**-**	**LF**	**550**
	Pot Holing	-	HR	4
	Structural Excavation	-	CY	407
	Cable Demolition	-	LF	550
	Disconnect Both Ends of Cable	-	HR	8
[02 12 05 02]	**Relocation**	**-**	**LF**	**550**
	Structural Excavation	-	CY	784
	Trench Shoring	-	SF	7,700
	12kv Cable Installation	-	CLF	5.50
	Fill and Compact From Stockpile	-	CY	1,192
	Connect Both Ends of Cable	-	HR	8
[02 14]	**Reach 14**	**-**	**LS**	**1**
[02 14 01]	**Underground Trench/Vault - STA 137+00**	**-**	**LF**	**110**
[02 14 01 01]	**Demolition**	**-**	**LF**	**110**
	Pot Holing	-	HR	4
	Structural Excavation	-	CY	81
	Duct Demolition	-	LF	110
[02 14 01 02]	**Relocation**	**-**	**LF**	**110**
	Structural Excavation	-	CY	157
	Electric Duct Installation	-	LF	110
	Aggregate Base, Material	15%	TON	7.0
	Aggregate Base, Placement	15%	CY	4.7
	Fill and Compact From Stockpile	-	CY	238
[02 14 02]	**24" CMP - STA 133+50**	**-**	**LF**	**45**
[02 14 02 01]	**Demolition**	**-**	**LF**	**45**
	Pot Holing	-	HR	4
	Structural Excavation	-	CY	33
	Pipe Demolition	-	LF	45
[02 14 02 02]	**Relocation**	**-**	**LF**	**45**
	Structural Excavation	-	CY	64
	27" RCP	-	LF	45
	Aggregate Base, Material	15%	TON	8.6
	Aggregate Base, Placement	15%	CY	5.8
	Fill and Compact From Stockpile	-	CY	98
[02 14 03]	**Underground 3-350A XLCJ 12kv**	**-**	**LF**	**550**
[02 14 03 01]	**Demolition**	**-**	**LF**	**550**
	Pot Holing	-	HR	4
	Structural Excavation	-	CY	407
	Cable Demolition	-	LF	550
	Disconnect Both Ends of Cable	-	HR	24
[02 14 03 02]	**Relocation**	**-**	**LF**	**550**
	Structural Excavation	-	CY	784
	12kv Cable Installation	-	CLF	16.50
	Fill and Compact From Stockpile	-	CY	1,192
	Connect Both Ends of Cable	-	HR	24
[09]	**CHANNELS**	**-**	**LS**	**1**
[09 AA]	**Mobilization / Demobilization**	**-**	**LS**	**1**
[09 BB]	**Dewatering**	**-**	**LS**	**1**
[09 BB 01]	**Dewatering Reaches 1-2**	**-**	**LS**	**1**
[09 BB 01 01]	**Coffer Dams**	**-**	**EA**	**2**
[09 BB 01 01 01]	**Cofferdam Installation**	**-**	**CY**	**534**
	Fill and Compact From Stockpile	15%	CY	614
	Embankment Liner	-	SF	2,700

Berryessa Creek Work Breakdown Structure Quantities

MCACES Source Tag	Item Description	Waste/Loss Factor (%)	Unit of Measure	Quantity
	Sandbags	-	EA	90
	Sand Material	15%	TON	10.8
	Sandbags Fill and Placement	-	EA	90
[09 BB 01 01 02]	**Cofferdam Removal**	**-**	**CY**	**267**
	Excavate, Load and Haul Downstream	-	CY	267
[09 BB 01 02]	**Dewater Pumping**	**-**	**LS**	**1**
	Dewatering Pump, Primary	-	DAY	94
	Dewatering Pump, Secondary	-	DAY	564
	24" HDPE Pipe	-	LF	3,500
[09 BB 02]	**Dewatering Reaches 3-8**	**-**	**LS**	**1**
[09 BB 02 01]	**Coffer Dams**	**-**	**EA**	**2**
[09 BB 02 01 01]	**Cofferdam Installation**	**-**	**CY**	**267**
	Fill and Compact From Stockpile	15%	CY	307
	Embankment Liner	-	SF	2,700
	Sandbags	-	EA	90
	Sand Material	15%	TON	10.8
	Sandbags Fill and Placement	-	EA	90
[09 BB 02 01 02]	**Cofferdam Removal**	**-**	**CY**	**267**
	Excavate, Load and Haul Downstream	-	CY	267
[09 BB 02 02]	**Dewater Pumping**	**-**	**LS**	**1**
	Dewatering Pump, Primary	-	DAY	167
	Dewatering Pump, Secondary	-	DAY	1,002
	24" HDPE Pipe	-	LF	3,300
[09 BB 03]	**Dewatering Reaches 9-10**	**-**	**LS**	**1**
[09 BB 03 01]	**Coffer Dams**	**-**	**EA**	**2**
[09 BB 03 01 01]	**Cofferdam Installation**	**-**	**CY**	**267**
	Fill and Compact From Stockpile	15%	CY	307
	Embankment Liner	-	SF	2,700
	Sandbags	-	EA	90
	Sand Material	15%	TON	10.8
	Sandbags Fill and Placement	-	EA	90
[09 BB 03 01 02]	**Cofferdam Removal**	**-**	**CY**	**267**
	Excavate, Load and Haul Downstream	-	CY	267
[09 BB 03 02]	**Dewater Pumping**	**-**	**LS**	**1**
	Dewatering Pump, Primary	-	DAY	68
	Dewatering Pump, Secondary	-	DAY	204
	24" HDPE Pipe	-	LF	1,200
[09 BB 04]	**Dewatering Reaches 11-12**	**-**	**LS**	**1**
[09 BB 04 01]	**Coffer Dams**	**-**	**EA**	**2**
[09 BB 04 01 01]	**Cofferdam Installation**	**-**	**CY**	**267**
	Fill and Compact From Stockpile	15%	CY	307
	Embankment Liner	-	SF	2,700
	Sandbags	-	EA	90
	Sand Material	15%	TON	10.8
	Sandbags Fill and Placement	-	EA	90
[09 BB 04 01 02]	**Cofferdam Removal**	**-**	**CY**	**267**
	Excavate, Load and Haul Downstream	-	CY	267
[09 BB 04 02]	**Dewater Pumping**	**-**	**LS**	**1**
	Dewatering Pump, Primary	-	DAY	139
	Dewatering Pump, Secondary	-	DAY	834
	24" HDPE Pipe	-	LF	3,500
[09 BB 05]	**Dewatering Reaches 13-16**	**-**	**LS**	**1**
[09 BB 05 01]	**Coffer Dams**	**-**	**EA**	**2**
[09 BB 05 01 01]	**Cofferdam Installation**	**-**	**CY**	**267**
	Fill and Compact From Stockpile	15%	CY	307
	Embankment Liner	-	SF	2,700
	Sandbags	-	EA	90

Berryessa Creek Work Breakdown Structure Quantities

MCACES Source Tag	Item Description	Waste/Loss Factor (%)	Unit of Measure	Quantity
	Sand Material	15%	TON	10.8
	Sandbags Fill and Placement	-	EA	90
[09 BB 05 01 02]	**Cofferdam Removal**	**-**	**CY**	**534**
	Excavate, Load and Haul	-	CY	534
[09 BB 05 02]	**Dewater Pumping**	**-**	**LS**	**1**
	Dewatering Pump, Primary	-	DAY	97
	Dewatering Pump, Secondary	-	DAY	291
	24" HDPE Pipe	-	LF	1,000
[09 CC]	**Clearing and Grubbing**	**-**	**ACRE**	**31**
[09 CC 01]	**Clear and Grub**	**-**	**ACRE**	**31**
	Clearing and Grubbing	-	ACRE	31
[09 CC 02]	**Load and Haul Debris**	**-**	**CY**	**12,400**
	Load and Haul Brush	-	CY	12,400
	Tipping Fee, Green Material	-	CY	3,100
[09 DD]	**Erosion Control**	**-**	**LS**	**1**
	Silt Fence	-	LF	21,440
	Straw Rolls	-	LF	42,880
	Construction Entrance	-	EA	10
[09 EE]	**Construction Access**	**-**	**LS**	**1**
[09 EE 01]	**Access Ramps**	**-**	**EA**	**10**
	Borrow Fill, Material	-	CY	135
	Aggregate Base, Material	-	TON	15
	Fill and Compact From Stockpile	-	CY	675
	Excavate Load and Haul Downstrema	15%	CY	621
	Excavate, Load and Haul to Disposal	-	CY	135
[09 EE 02]	**Temporary Access Roads**	**-**	**EA**	**10**
	Aggregate Base, Material	15%	TON	77
	Aggregate Base, Material	15%	CY	256
	Excavate Load and Haul Downstream	-	CY	1,022
	Excavate, Load and Haul to Disposal	-	CY	51
[09 01]	**Reach 1**	**-**	**LS**	**1**
[09 01 01]	**Excavate and Haul**	**-**	**CY**	**75**
	Excavate, Load and Haul	-	CY	75
[09 02]	**Reach 2**	**-**	**LS**	**1**
[09 02 01]	**Place and Compact Fill**	**-**	**CY**	**100**
	Fill and Compact From Stockpile	15%	CY	115
[09 02 02]	**Excavate and Haul**	**-**	**CY**	**4,074**
	Excavate, Load and Haul	-	CY	4,074
[09 02 03]	**Import and Place Riprap**	**-**	**TON**	**5,750**
	Rip Rap, Material	15%	TON	6,613
	Rip Rap, Placement	15%	TON	6,613
[09 02 04]	**Geotextile Fabric**	**-**	**SY**	**7,700**
	Geotextile Fabric, Material	5%	SY	8,085
	Geotextile Fabric, Staples	-	EA	7,700
	Geotextile Fabric, Placement	5%	SY	8,085
[09 02 05]	**Cellular Confinement System**	**-**	**SF**	**20,453**
	Cellular Confinement System, Material	5%	SF	21,476
	Cellular Confinement System, Placement	5%	SF	21,476
	Top Soil, Material	-	CY	379
	Top Soil, Placement	-	CY	379
[09 02 06]	**CIP Concrete**	**-**	**CY**	**90**
[09 02 06 01]	**Earthwork**	**-**	**CY**	**235**
	Excavate to Stockpile	-	CY	235
	Fill and Compact From Stockpile	-	CY	172
[09 02 06 02]	**Concrete**	**-**	**CY**	**90**
	Concrete, Forms	-	SFC	4,000
	Concrete, Material	10%	CY	99

Berryessa Creek Work Breakdown Structure Quantities

MCACES Source Tag	Item Description	Waste/Loss Factor (%)	Unit of Measure	Quantity
	Concrete, Placement	10%	CY	99
[09 02 07]	**Reinforcing Steel**	**-**	**LB**	**18,000**
	Reinforcing Steel, Material	-	TON	9.0
	Reinforcing Steel, Placement	-	LBS	18,000
[09 02 08]	**Planting - Grasses on Banks**	**-**	**ACRE**	**1.92**
	Hydroseeding	-	SY	9,289
[09 03]	**Reach 3**	**-**	**LS**	**1**
[09 03 01]	**Excavate and Haul**	**-**	**CY**	**150**
	Excavate, Load and Haul	-	CY	150
[09 04]	**Reach 4**	**-**	**LS**	**1**
[09 04 01]	**Excavate and Haul**	**-**	**CY**	**896**
	Excavate, Load and Haul	-	CY	896
[09 04 02]	**Import and Place Riprap**	**-**	**TON**	**1,000**
	Rip Rap, Material	15%	TON	1,150
	Rip Rap, Placement	15%	TON	1,150
[09 04 03]	**Geotextile Fabric**	**-**	**SY**	**1,400**
	Geotextile Fabric, Material	5%	SY	1,470
	Geotextile Fabric, Staples	-	EA	1,400
	Geotextile Fabric, Placement	5%	SY	1,470
[09 04 04]	**Cellular Confinement System**	**-**	**SF**	**8,156**
	Cellular Confinement System, Material	5%	SF	8,564
	Cellular Confinement System, Placement	5%	SF	8,564
	Top Soil, Material	-	CY	151
	Top Soil, Placement	-	CY	151
[09 04 05]	**Planting - Grasses on Banks**	**-**	**ACRE**	**0.41**
	Hydroseeding	-	SY	2,000
[09 05]	**Reach 5**	**-**	**LS**	**1**
[09 05 01]	**Excavate and Haul**	**-**	**CY**	**10**
	Excavate, Load and Haul	-	CY	10
[09 05 02]	**Temporary Shoo-Fly Structure**	**-**	**LS**	**1**
[09 05 02 01]	**Embankment**	**-**	**CY**	**306**
	Borrow Fill, Material	15%	CY	351
	Fill and Compact From Stockpile	15%	CY	351
[09 05 02 02]	**Railroad Track**	**-**	**LF**	**250**
	Ballast Stone	15%	TON	335
	Railroad Track	-	LF	500
	Railroad Ties	-	BF	8,077
	Railroad Switch	-	EA	2
[09 05 02 03]	**Demolition**	**-**	**LF**	**250**
	Remove Railroad Ties and Track	-	LF	250
	Remove Turnout	-	EA	2
	Rock Load and Haul	-	CY	194
	Excavate, Load and Haul	-	CY	306
	Tipping Fee	-	CY	32
[09 05 03]	**Demo, Haul, and Dispose Rails**	**-**	**LF**	**120**
	Remove Railroad Ties and Track	-	LF	120
	Load and Haul	-	CY	48
[09 05 04]	**Demo, Haul, and Dispose Timber**	**-**	**BF**	**10,000**
	Timber Demolition	-	MBF	10
	Load and Haul	-	CY	833
	Rock Load and Haul	-	CY	833
[09 05 05]	**Excavate, Backfill and Compact**	**-**	**CY**	**250**
	Excavate, Backfill and Compact	-	CY	250
[09 05 06]	**Construct Replacement Culvert (Triple Box)**	**-**	**CY**	**350**
	Concrete, Forms	-	SFC	8,750
	Concrete, Material	10%	CY	385
	Concrete, Placement	10%	CY	385

Berryessa Creek Work Breakdown Structure Quantities

MCACES Source Tag	Item Description	Waste/Loss Factor (%)	Unit of Measure	Quantity
[09 05 07]	**Reinforcing Steel**	**-**	**LB**	**70,000**
	Reinforcing Steel, Shop Hanlding	-	TON	35.0
	Reinforcing Steel, Unload and Sort	-	TON	35.0
	Reinforcing Steel, Placement	-	LBS	70,000
[09 05 08]	**Construct Wingwalls & Headwalls w/ Rails**	**-**	**EA**	**6**
[09 05 08 01]	**Cast-in-Place Concrete**	**-**	**CY**	**53**
	Concrete, Forms	-	SFC	1,440
	Concrete, Material	10%	CY	59
	Concrete, Placement	10%	CY	59
[09 05 08 02]	**Reinforcing Steel**	**-**	**LB**	**10,600**
	Reinforcing Steel, Material	-	TON	5.3
	Reinforcing Steel, Placement	-	LBS	10,600
[09 05 08 03]	**Railing**	**-**	**LF**	**120**
	Railing	-	LF	120
[09 05 09]	**Reconstruct Rails and Ties**	**-**	**LF**	**120**
	Ballast Stone	15%	TON	57
	Railroad Track	-	LF	240
	Railroad Ties	-	BF	3,877
[09 05 10]	**Import and Place Riprap**	**-**	**TON**	**75**
	Rip Rap, Material	15%	TON	86
	Rip Rap, Placement	15%	TON	86
[09 05 11]	**Planting - Grasses on Banks**	**-**	**ACRE**	**0.10**
	Hydroseeding	-	SY	484
[09 06]	**Reach 6**	**-**	**LS**	**1**
[09 06 01]	**Excavate and Haul**	**-**	**CY**	**4,257**
	Excavate, Load and Haul	-	CY	4,257
[09 06 02]	**Import and Place Riprap**	**-**	**TON**	**4,750**
	Rip Rap, Material	15%	TON	5,463
	Rip Rap, Placement	15%	TON	5,463
[09 06 03]	**Geotextile Fabric**	**-**	**SY**	**6,650**
	Geotextile Fabric, Material	5%	SY	6,983
	Geotextile Fabric, Staples	-	EA	6,650
	Geotextile Fabric, Placement	5%	SY	6,983
[09 06 04]	**Cellular Confinement System**	**-**	**SF**	**20,351**
	Cellular Confinement System, Material	5%	SF	21,368
	Cellular Confinement System, Placement	5%	SF	21,368
	Top Soil, Material	-	CY	377
	Top Soil, Placement	-	CY	377
[09 06 05]	**Planting - Grasses on Banks**	**-**	**ACRE**	**2.05**
	Hydroseeding	-	SY	9,922
[09 07]	**Reach 7**	**-**	**LS**	**1**
[09 07 01]	**Excavate and Haul**	**-**	**CY**	**60**
	Excavate, Load and Haul	-	CY	60
[09 08]	**Reach 8**	**-**	**LS**	**1**
[09 08 01]	**Excavate and Haul**	**-**	**CY**	**1,222**
	Excavate, Load and Haul	-	CY	1,222
[09 08 02]	**Import and Place Riprap**	**-**	**TON**	**1,000**
	Rip Rap, Material	15%	TON	1,150
	Rip Rap, Placement	15%	TON	1,150
[09 08 03]	**Geotextile Fabric**	**-**	**SY**	**1,400**
	Geotextile Fabric, Material	5%	SY	1,470
	Geotextile Fabric, Staples	-	EA	1,400
	Geotextile Fabric, Placement	5%	SY	1,470
[09 08 04]	**Cellular Confinement System**	**-**	**SF**	**3,419**
	Cellular Confinement System, Material	5%	SF	3,590
	Cellular Confinement System, Placement	5%	SF	3,590
	Top Soil, Material	-	CY	63

Berryessa Creek Work Breakdown Structure Quantities

MCACES Source Tag	Item Description	Waste/Loss Factor (%)	Unit of Measure	Quantity
	Top Soil, Placement	-	CY	63
[09 08 05]	**Planting - Grasses on Banks**	**-**	**ACRE**	**0.37**
	Hydroseeding	-	SY	1,778
[09 09]	**Reach 9**	**-**	**LS**	**1**
[09 09 01]	**Excavate and Haul**	**-**	**CY**	**200**
	Excavate, Load and Haul	-	CY	200
[09 09 02]	**Excavate, Backfill and Compact**	**-**	**CY**	**100**
	Excavate, Backfill and Compact	-	CY	100
[09 09 03]	**Sheet Piling**	**-**	**SF**	**1,200**
	Sheet Pile Set Up and Removal	-	EA	1
	Sheet Pile, Material	-	SF	1,200
	Sheet Pile, Driven	-	VLF	800
[09 09 04]	**Import and Place Riprap**	**-**	**TON**	**50**
	Rip Rap, Material	15%	TON	58
	Rip Rap, Placement	15%	TON	58
[09 10]	**Reach 10**	**-**	**LS**	**1**
[09 10 01]	**Excavate and Haul**	**-**	**CY**	**2,600**
	Excavate, Load and Haul	-	CY	2,600
[09 10 02]	**Import and Place Riprap**	**-**	**TON**	**3,000**
	Rip Rap, Material	15%	TON	3,450
	Rip Rap, Placement	15%	TON	3,450
[09 10 03]	**Geotextile Fabric**	**-**	**SY**	**4,200**
	Geotextile Fabric, Material	5%	SY	4,410
	Geotextile Fabric, Staples	-	EA	4,200
	Geotextile Fabric, Placement	5%	SY	4,410
[09 10 04]	**Cellular Confinement System**	**-**	**SF**	**5,967**
	Cellular Confinement System, Material	5%	SF	6,265
	Cellular Confinement System, Placement	5%	SF	6,265
	Top Soil, Material	-	CY	110
	Top Soil, Placement	-	CY	110
[09 10 05]	**Planting - Grasses on Banks**	**-**	**ACRE**	**1.10**
	Hydroseeding	-	SY	5,333
[09 11]	**Reach 11**	**-**	**LS**	**1**
[09 11 01]	**Excavate and Haul**	**-**	**CY**	**200**
	Excavate, Load and Haul	-	CY	200
[09 11 02]	**Excavate, Backfill and Compact**	**-**	**CY**	**100**
	Excavate, Backfill and Compact	-	CY	100
[09 11 03]	**Sheet Piling**	**-**	**SF**	**1,200**
	Sheet Pile Set Up and Removal	-	EA	1
	Sheet Pile, Material	-	SF	1,200
	Sheet Pile, Driven	-	VLF	800
[09 11 04]	**Import and Place Riprap**	**-**	**TON**	**50**
	Rip Rap, Material	15%	TON	58
	Rip Rap, Placement	15%	TON	58
[09 12]	**Reach 12**	**-**	**LS**	**1**
[09 12 01]	**Place and Compact Fill**	**-**	**CY**	**75**
	Fill and Compact From Stockpile	15%	CY	86
[09 12 02]	**Excavate and Haul**	**-**	**CY**	**24,278**
	Excavate, Load and Haul	-	CY	24,278
[09 12 03]	**Excavate and Regrade Onsite**	**-**	**CY**	**25**
	Excavate, Load and Haul	-	CY	25
[09 12 04]	**Import and Place Riprap**	**-**	**TON**	**7,750**
	Rip Rap, Material	15%	TON	8,913
	Rip Rap, Placement	15%	TON	8,913
[09 12 05]	**Geotextile Fabric**	**-**	**SY**	**10,500**
	Geotextile Fabric, Material	5%	SY	11,025
	Geotextile Fabric, Staples	-	EA	10,500

Berryessa Creek Work Breakdown Structure Quantities

MCACES Source Tag	Item Description	Waste/Loss Factor (%)	Unit of Measure	Quantity
	Geotextile Fabric, Placement	5%	SY	11,025
[09 12 06]	**Cellular Confinement System**	**-**	**SF**	**34,227**
	Cellular Confinement System, Material	5%	SF	35,938
	Cellular Confinement System, Placement	5%	SF	35,938
	Top Soil, Material	-	CY	634
	Top Soil, Placement	-	CY	634
[09 12 07]	**Roadway Base**	**-**	**CY**	**3,000**
	Aggregate Base, Material	15%	TON	5,175
	Aggregate Base, Placement	15%	CY	3,450
[09 12 08]	**Access Road Surface**	**-**	**SF**	**54,000**
	Asphalt, Binder Course	10%	SY	6,600
	Asphalt, Wearing Course	10%	SY	6,600
[09 12 09]	**CIP Concrete**	**-**	**CY**	**440**
[09 12 06 01]	**Earthwork**	**-**	**CY**	**1,203**
	Excavate to Stockpile	-	CY	1,203
	Fill and Compact From Stockpile	-	CY	883
[09 12 06 02]	**Concrete**	**-**	**CY**	**440**
	Concrete, Forms	-	SFC	19,556
	Concrete, Material	10%	CY	484
	Concrete, Placement	10%	CY	484
[09 12 10]	**Reinforcing Steel**	**-**	**LB**	**88,000**
	Reinforcing Steel, Material	-	TON	44.0
	Reinforcing Steel, Placement	-	LBS	88,000
[09 12 11]	**Planting - Grasses on Banks**	**-**	**ACRE**	**3.44**
	Hydroseeding	-	SY	16,667
[09 13]	**Reach 13**	**-**	**LS**	**1**
[09 13 01]	**Excavate and Haul**	**-**	**CY**	**75**
	Excavate, Load and Haul	-	CY	75
[09 14]	**Reach 14**	**-**	**LS**	**1**
[09 14 02]	**Excavate and Haul**	**-**	**CY**	**6,861**
	Excavate, Load and Haul	-	CY	6,861
[09 14 04]	**Import and Place Riprap**	**-**	**TON**	**1,250**
	Rip Rap, Material	15%	TON	1,438
	Rip Rap, Placement	15%	TON	1,438
[09 14 05]	**Geotextile Fabric**	**-**	**SY**	**1,750**
	Geotextile Fabric, Material	5%	SY	1,838
	Geotextile Fabric, Staples	-	EA	1,750
	Geotextile Fabric, Placement	5%	SY	1,838
[09 14 06]	**Cellular Confinement System**	**-**	**SF**	**8,803**
	Cellular Confinement System, Material	5%	SF	9,244
	Cellular Confinement System, Placement	5%	SF	9,244
	Top Soil, Material	-	CY	163
	Top Soil, Placement	-	CY	163
[09 14 07]	**Roadway Base**	**-**	**CY**	**500**
	Aggregate Base, Material	15%	TON	863
	Aggregate Base, Placement	15%	CY	575
[09 14 08]	**Access Road Surface**	**-**	**SF**	**9,000**
	Asphalt, Binder Course	10%	SY	1,100
	Asphalt, Wearing Course	10%	SY	1,100
[09 14 09]	**CIP Concrete**	**-**	**CY**	**220**
[09 14 06 01]	**Earthwork**	**-**	**CY**	**601**
	Excavate to Stockpile	-	CY	601
	Fill and Compact From Stockpile	-	CY	441
[09 14 06 02]	**Concrete**	**-**	**CY**	**220**
	Concrete, Forms	-	SFC	9,778
	Concrete, Material	10%	CY	242
	Concrete, Placement	10%	CY	242

Berryessa Creek Work Breakdown Structure Quantities

MCACES Source Tag	Item Description	Waste/Loss Factor (%)	Unit of Measure	Quantity
[09 14 10]	**Reinforcing Steel**	**-**	**LB**	**44,000**
	Reinforcing Steel, Material	-	TON	22.0
	Reinforcing Steel, Placement	-	LBS	44,000
[09 14 11]	**Planting - Grasses on Banks**	**-**	**ACRE**	**0.52**
	Hydroseeding	-	SY	2,500
[09 15]	**Reach 15**	**-**	**LS**	**1**
[09 15 01]	**Excavate and Haul**	**-**	**CY**	**150**
	Excavate, Load and Haul	-	CY	150
[09 16]	**Reach 16**	**-**	**LS**	**1**
[09 16 01]	**Excavate and Haul**	**-**	**CY**	**1,215**
	Excavate, Load and Haul	-	CY	1,215
[14]	**RECREATION**	**-**	**LS**	**1**
[14 01]	**Recreation Trails and Access Points**	**-**	**LS**	**1**
[14 01 01]	**Asphalt Concrete Trail**	**-**	**SF**	**244,000**
[14 01 01 01]	**Roadway Base**	**-**	**CY**	**3,012**
	Aggregate Base, Material	15%	TON	5,196
	Aggregate Base, Placement	15%	TON	3,464
[14 01 01 02]	**Trail Surface**	**-**	**SF**	**244,000**
	Asphalt, Binder Course	10%	SY	29,822
	Asphalt, Wearing Course	10%	SY	29,822
[14 01 02]	**Access Points**	**-**	**EA**	**20**
	Benches	-	EA	40
	Signs	-	EA	40

Berryessa Quantity Summary

Item No.	Item	UOM	Quantity
1	Clearing and Grubbing	ACRE	31
2	Place and Compact Fill	CY	175
3	Excavate and Haul	CY	46,324
4	Import and Place Rip Rap	TON	24,675
5	Geotextile	SY	33,600
6	Cellular Confinement System	SF	101,376
7	Cast-in-place Concrete	CY	950
8	Reinforcing Steel	TON	260,000
9	Planting - Grasses on Banks	ACRE	8.71
10	Temporary Shoo-Fly Structure	LS	1
11	Demo, Haul and Dispose Rails	TF	120
12	Demo, Haul and Dispose Timber	BF	10,000
13	Excavate, Backfill and Compact	CY	450
14	Construct Replacement Culvert	CY	350
15	Construct Wingwalls and Headwalls	EA	6
16	Reconstruct Rails and Ties	TF	120
17	Planting	ACRE	9.91
18	Sheet Piling	SF	2,400
19	Excavate and Regrade Onsite	CY	25
20	Roadway Base	CY	3,500
21	Access Road Surface	SF	63,000
22	Recreation - Ashpalt Trail	SF	244,000
23	Access Points	EA	20

Berryessa Creek Quantities by Reach

Reach No.	Reach Name	Item	UOM	Quantity
1	I-680 Bridge	Earthwork - excavate and haul	CY	75
2	I-680 to Montague - Channel	Relocate utilities	LS	1
		Earthwork - place and compact fill (bend scour area)	CY	100
		Earthwork - excavate and haul	CY	4,074
		Import and place rip rap	TON	5,750
		Geotextile	SY	7,700
		Cellular confinement system	SF	20,453
		Cast-in-place concrete (channel walls/bend)	CY	90
		Reinforcing steel	LB	18,000
		Planting - grasses on banks	ACRE	1.92
3	Montague	Earthwork - excavate and haul	CY	150
4	Montague to UPRR Trestle - Channel	Relocate utilities	LS	1
		Earthwork - excavate and haul	CY	896
		Import and place rip rap	TON	1,000
		Geotextile	SY	1,400
		Cellular confinement system	SF	8,156
		Planting - grasses on banks	ACRE	0.41
5	Railroad Trestle	Earthwork - excavate and haul	CY	10
		Temporary Shoo-Fly Structure	LS	1
		Demo, haul, and dispose rails	LF	120
		Demo, haul, and dispose timber	BF	10,000
		Relocate utilities	LS	1
		Earthwork - excavate, backfill, and compact	CY	250
		Construct replacement culvert (triple box)	CY	350
		Reinforcing steel	LB	70,000
		Construct wingwalls, headwalls w/ rails (cast-in-place sloping wingwalls))	EA	6
		Reconstruct rails and ties	LF	120
		Import and place rip rap	TON	75
		Planting	ACRE	0.1
6	UPRR Trestle to Culvert - Channel	Relocate utilities	LS	1
		Earthwork - excavate and haul	CY	4,257
		Import and place rip rap	TON	4,750
		Geotextile	SY	6,650
		Cellular confinement system	SF	20,351
		Planting - grasses on banks	ACRE	2.05
7	UPRR Culvert	Earthwork - excavate and haul	CY	60
8	UPRR Culvert to Ames - Channel	Relocate utilities	LS	1
		Earthwork - excavate and haul	CY	1,222
		Import and place rip rap	TON	1,000
		Geotextile	SY	1,400
		Cellular confinement system	SF	3,419
		Planting - grasses on banks	ACRE	0.37
9	Ames Bridge	Relocate utilities	LS	1
		Earthwork - excavate and haul	CY	200
		Earthwork - excavate, backfill and compact	CY	100
		Sheet piling	SF	1,200
		Cast-in-place concrete	CY	100
		Reinforcing steel	LB	20,000
		Import and place rip rap	TON	50
10	Ames to Yosemite - Channel	Relocate utilities	LS	1
		Earthwork - excavate and haul	CY	2,600
		Import and place rip rap	TON	3,000
		Geotextile	SY	4,200
		Cellular confinement system	SF	5,967
		Planting - grasses on banks	ACRE	1.10
11	Yosemite Bridge	Relocate utilities	LS	1
		Earthwork - excavate and haul	CY	200
		Earthwork - excavate, backfill and compact	CY	100
		Sheet piling	SF	1,200
		Cast-in-place concrete	CY	100
		Reinforcing steel	LB	20,000
		Import and place rip rap	TON	50
12	Yosemite to Los Coches - Channel	Relocate utilities	LS	1
		Earthwork - place and compact fill, Piedmont Crk Confl	CY	75
		Earthwork - excavate and haul	CY	24,278
		Earthwork - excavate and regrade onsite	CY	25
		Import and place rip rap	TON	7,750
		Geotextile	SY	10,500
		Cellular confinement system	SF	34,227
		Roadway base	CY	3,000
		Access road surface	SF	54,000
		Cast-in-place concrete (channel walls)	CY	440
		Reinforcing steel	LB	88,000
		Planting - grasses on banks	ACRE	3.44
13	Los Coches Bridge	Earthwork - excavate and haul	CY	75
14	Los Coches to Calaveras - Channel	Relocate utilities	LS	1
		Earthwork - excavate and haul	CY	6,861
		Import and place rip rap	TON	1,250
		Geotextile	SY	1,750
		Cellular confinement system	SF	8,803
		Roadway base	CY	500
		Access road surface	SF	9,000
		Cast-in-place concrete (channel walls)	CY	220
		Reinforcing steel	LB	44,000
		Planting - grasses on banks	ACRE	0.52
15	Calaveras Blvd	Earthwork - excavate and haul	CY	150
16	Downstream	Earthwork - excavate and haul	CY	1,215

Berryessa Creek Earthwork Volumes

Reach				Existing				Proposed						Difference		
From	To	Reach No.	Length	Bank Height	Bottom Width	Side Slope	Cross Section Area	Bank Height	Bottom Width	Side Slope	Access Road Height	Access Road Width	Cross Section Area	Cross Section	Excavation Volume	
			(ft)	(ft)	(ft)		(sf)	(ft)	(ft)		(ft)	(ft)	(sf)	(sf)	(cf)	(cy)
Calaveras	Los Coches	14	500	11	22	1.5	424	11	42	2	5	18	794	370.5	185,250	6,861
Los Coches	Yosemite	12	3,000	7	20	1.5	214	7	40	2	3	18	432	218.5	655,500	24,278
Yosemite	Ames	10	1,200	9	13	1.5	239	9	15	2	0	0	297	58.5	70,200	2,600
Ames	UPRR Culvert	8	400	11	12	1.5	314	11	14	2	0	0	396	82.5	33,000	1,222
UPRR Culvert	UPRR Trestle	6	1,900	11	12	1.5	314	11	12	2	0	0	374	60.5	114,950	4,257
UPRR Trestle	Montague	4	400	11	12	1.5	314	11	12	2	0	0	374	60.5	24,200	896
Montague	End of Project	2	2,200	10	12	1.5	270	10	12	2	0	0	320	50	110,000	4,074

Berryessa Creek Utility Relocations

Owner	Utility Type	Size	Stationing	Reach	Easement	Real Property Owner	Length
PG&E	Electrical	12kv Underground Lines	STA 233+00	2	Unknown	SCVWD	75
PG&E	Electrical	Overhead power lines	STA 231+20	2	Unknown	SCVWD	100
City of San Jose	Storm Drain System	24" with 36" Diameter Channel Flap Gate	STA 226+00	2	SCVWD	SCVWD	30
PG&E	Electrical	3-350A	STA 222+00 to 222+60	2	Unknown	SCVWD	140
PG&E	Electrical	12kv	STA 211+80 to 214+60	2	Unknown	SCVWD	280
PG&E	Electrical	12kv	STA 208+40	4	Unknown	Standard Realty and Development Co.	55
PG&E	Electrical	12kv	STA 205+80	6	Unknown	Standard Realty and Development Co.	75
PG&E	Electrical	12kv	STA 197+60	6	Unknown	Standard Realty and Development Co.	60
City of Milpitas	Waterline	12" ACWP	STA 183+00	8	Unknown	Standard Realty and Development Co.	75
City of Milpitas	Storm Drain Outlet	30" RCP	STA 182+80	8	Unknown	Standard Realty and Development Co.	45
AT&T	Telephone Conduit	NA	STA 160+00	12	Unknown	SCVWD	200
City of Milpitas	Storm Drain Outlet	27" CMP	STA 154+00	12	SCVWD	Unknown	35
PG&E	Electrical	3-1/0A XLCJ 21kv 4" underground/transformer	STA 151+00	12	Unknown	Unknown	70
PG&E	Electrical	3-700A and 1-350A 4" underground	STA 149+20 to 151+00	12	Unknown	Unknown	160
PG&E	Electrical	Underground 12kv	STA 138+60 to 143+70	12	Unknown	Unknown	550
Comcast	Cable	Underground Trench/Vault	STA 137+00	14	Unknown	SCVWD D.O.C 42534949	110
City of Milpitas	Storm Drain Outlet	24" CMP	STA 133+50	14	SCVWD	SCVWD D.O.C 42534949	45
PG&E	Electrical	Underground 3-350A XLCJ 12KV 6"	STA 132+00 to 138+00	14	Unknown	SCVWD D.O.C 42534949	550

TETRA TECH, INC.

PROJECT: Berryessa Creek Flood Control
DETAIL: Detailed Quantity Take-Offs for Dewatering
COMPUTED BY: SKV JOB NO.: T26465
CHECKED BY: DATE: 12/31/2011

[09 BB] DEWATERING

Quantities per 1 Cofferdam

Earthern Cofferdam

Height = 7.5 ft
Top Width = 8 ft
Bottom Width = 31 ft
Length of Dam = 50 lf

Dam Volume = **267 CY**

Impermeable Liner

Length = 50 lf
Width = 13.5 lf
# of Slopes = 2 ea

Liner Area = **1,350 SF**

TETRA TECH, INC.

PROJECT: Berryessa Creek Flood Control
DETAIL: Detailed Quantity Take-Offs for Temporary Shoo-Fly Structure
COMPUTED BY: SKV JOB NO.: T26465
CHECKED BY: DATE: 12/31/2011

[09 05] REACH 5

[09 05 02] Temporary Shoo-Fly Structure

[09 05 02 01] Embankment

Earthen Berm

Height = 5 ft
Top Width = 9 ft
Bottom Width = 24 ft
Length = 100 lf

Berm Volume = **306 CY**

[09 05 02 02] Railroad Track

Ballast Stone

Depth = 2.33 ft
Width = 9 ft
Length of Track = 250 lf
Density = 1.5 ton/cy

Stone Weight = **292 TON**

Railroad Ties

Length = 250 lf
Spacing = 1.625 ft
Board Feet per Tie = 52.5 bf

Railroad Ties = **8,077 BF**

[02 02] REACH 2

[02 02 01] 12kv Underground Line

[02 02 01 01] Demolition

Line Demolition
Length = 75 lf

Line Demolition = **75 LF**

Excavation
Depth = 5 ft
Width = 4 ft
Length = 75 lf

Excavation Volume = **56 CY**

[02 02 01 02] Relocation

Extra Excavation, Box Trench
Depth = 5 ft
Width = 4 ft
Length = 75 lf

Excavation Volume = **56 CY**

Extra Excavation, Top Edges (1.5:1)
Depth = 3 ft
Width = 4.5 ft
Length = 75 lf
# of Sides = 2 ea

Excavation Volume = **38 CY**

Trench Box
Depth = 7 ft
Length = 75 lf
# of Sides = 2 ea

Excavation Volume = **1,050 SF**

Backfill
Demo Excavation = 56 cy
Extra Excavation = 93 cy

Backfill Volume = **149 CY**

[02 02 02] 24" CMP with 36" Flap Gate

[02 02 02 01] Demolition

CMP Demolition

Length = 30 lf

Pipe Demolition **30 LF**

Concrete Demolition, Headwall

Length = 8.5 ft
Height = 3.67 ft
Thickness = .75 ft

Headwall Demolition = **.9 CY**
Headwall Demolition = **23 CF**

Concrete Demolition, Footing

Length = 8.5 ft
Height = .75 ft
Thickness = 2.0 ft

Footing Demolition = **.5 CY**
Footing Demolition = **13 CF**

Excavation

Depth = 5 ft
Width = 4 ft
Length = 30 lf

Excavation Volume = **22 CY**

[02 02 02 02] Replace Outlet Structure

Extra Excavation, Box Trench

Depth = 5 ft
Width = 4 ft
Length = 30 lf

Excavation Volume = **22 CY**

Extra Excavation, Top Edges (1.5:1)

Depth = 3 ft
Width = 4.5 ft
Length = 30 lf
# of Sides = 2 ea

Excavation Volume = **15 CY**

Trench Box

Depth = 7 ft
Length = 30 lf
# of Sides = 2 ea

Excavation Volume = **420 SF**

Riprap

Length = 5.0 ft
Width = 5.00 ft
Thickness = 1.00 ft

Riprap Volume = **.9 CY**
Riprap Weight = **1.4 TON**

[02 02 03] 350A Underground Line

[02 02 03 01] Demolition

Line Demolition

Length = 140 lf

Line Demolition = **140 LF**

Excavation

Depth = 5 ft
Width = 4 ft
Length = 140 lf

Excavation Volume = **104 CY**

[02 02 03 02] Relocation

Extra Excavation, Box Trench

Depth = 5 ft
Width = 4 ft
Length = 140 lf

Excavation Volume = **104 CY**

Extra Excavation, Top Edges (1.5:1)
Depth = 3 ft
Width = 4.5 ft
Length = 140 lf
# of Sides = 2 ea

Excavation Volume = **70 CY**

Trench Box
Depth = 7 ft
Length = 140 lf
# of Sides = 2 ea

Excavation Volume = **1,960 SF**

Backfill
Demo Excavation = 104 cy
Extra Excavation = 174 cy

Backfill Volume = **277 CY**

[02 02 04] 12kv Underground Line
[02 02 04 01] Demolition

Line Demolition
Length = 280 lf

Line Demolition = **280 LF**

Excavation
Depth = 5 ft
Width = 4 ft
Length = 280 lf

Excavation Volume = **207 CY**

[02 02 04 02] Relocation

Extra Excavation, Box Trench
Depth = 5 ft
Width = 4 ft
Length = 280 lf

Excavation Volume = **207 CY**

Extra Excavation, Top Edges (1.5:1)
Depth = 3 ft
Width = 4.5 ft
Length = 280 lf
# of Sides = 2 ea

Excavation Volume = **140 CY**

Trench Box
Depth = 7 ft
Length = 280 lf
# of Sides = 2 ea

Excavation Volume = **3,920 SF**

Backfill
Demo Excavation = 207 cy
Extra Excavation = 347 cy

Backfill Volume = **555 CY**

[02 04 01] 12kv Underground Line
[02 04 01 01] Demolition

Line Demolition
Length = 55 lf

Line Demolition = **55 LF**

Excavation
Depth = 5 ft
Width = 4 ft
Length = 55 lf

Excavation Volume = **41 CY**

[02 04 01 02] Relocation

Extra Excavation, Box Trench
Depth = 5 ft
Width = 4 ft
Length = 55 lf

Excavation Volume = **41 CY**

Extra Excavation, Top Edges (1.5:1)
Depth = 3 ft
Width = 4.5 ft
Length = 55 lf
# of Sides = 2 ea

Excavation Volume = **28 CY**

Trench Box
Depth = 7 ft
Length = 55 lf
# of Sides = 2 ea

Excavation Volume = **770 SF**

Backfill
Demo Excavation = 41 cy
Extra Excavation = 68 cy

Backfill Volume = **109 CY**

[02 06 01] 12kv Underground Line
[02 06 01 01] Demolition

Line Demolition
Length = 75 lf

Line Demolition = **75 LF**

Excavation
Depth = 5 ft
Width = 4 ft
Length = 75 lf

Excavation Volume = **56 CY**

[02 06 01 02] Relocation

Extra Excavation, Box Trench
Depth = 5 ft
Width = 4 ft
Length = 75 lf

Excavation Volume = **56 CY**

Extra Excavation, Top Edges (1.5:1)
Depth = 3 ft
Width = 4.5 ft
Length = 75 lf
# of Sides = 2 ea

Excavation Volume = **38 CY**

Trench Box
Depth = 7 ft
Length = 75 lf
# of Sides = 2 ea

Excavation Volume = **1,050 SF**

Backfill
Demo Excavation = 56 cy
Extra Excavation = 93 cy

Backfill Volume = **149 CY**

[02 06 02] 12kv Underground Line
[02 06 02 01] Demolition

Line Demolition
Length = 60 lf

Line Demolition = **60 LF**

Excavation
Depth = 5 ft
Width = 4 ft
Length = 60 lf

Excavation Volume = **44 CY**

[02 06 02 02] Relocation

Extra Excavation, Box Trench
Depth = 5 ft
Width = 4 ft
Length = 60 lf

Excavation Volume = **44 CY**

Extra Excavation, Top Edges (1.5:1)

Depth = 3 ft
Width = 4.5 ft
Length = 60 lf
# of Sides = 2 ea

Excavation Volume = **30 CY**

Trench Box

Depth = 7 ft
Length = 60 lf
# of Sides = 2 ea

Excavation Volume = **840 SF**

Backfill

Demo Excavation = 44 cy
Extra Excavation = 74 cy

Backfill Volume = **119 CY**

[02 08 01] 12" Waterline

[02 08 01 01] Demolition

Pipe Demolition

Length = 75 lf
No. of Pipes = 2 ea

Pipe Demolition = **150 LF**

Excavation

Depth = 5 ft
Width = 4 ft
Length = 150 lf

Excavation Volume = **111 CY**

[02 08 01 02] Relocation

Extra Excavation, Box Trench

Depth = 5 ft
Width = 4 ft
Length = 150 lf

Excavation Volume = **111 CY**

Extra Excavation, Top Edges (1.5:1)
Depth = 3 ft
Width = 4.5 ft
Length = 150 lf
# of Sides = 2 ea

Excavation Volume = **75 CY**

Trench Box
Depth = 7 ft
Length = 150 lf
# of Sides = 2 ea

Excavation Volume = **2,100 SF**

Backfill
Demo Excavation = 111 cy
Extra Excavation = 186 cy

Backfill Volume = **297 CY**

[02 08 02] 30" RCP
[02 08 02 01] Demolition

Pipe Demolition
Length = 45 lf

Pipe Demolition = **45 LF**

Excavation
Depth = 5 ft
Width = 5 ft
Length = 45 lf

Excavation Volume = **42 CY**

[02 08 02 02] Relocation

Extra Excavation, Box Trench
Depth = 5 ft
Width = 4 ft
Length = 45 lf

Excavation Volume = **33 CY**

Extra Excavation, Top Edges (1.5:1)

Depth = 3 ft
Width = 4.5 ft
Length = 45 lf
# of Sides = 2 ea

Excavation Volume = **23 CY**

Trench Box

Depth = 7 ft
Length = 45 lf
# of Sides = 2 ea

Excavation Volume = **630 SF**

Backfill

Demo Excavation = 42 cy
Extra Excavation = 56 cy

Backfill Volume = **98 CY**

Bedding Material

Depth = 1.5 ft
Length = 45 ft
Width = 3.0 ft

Bedding Volume = **7.5 CY**

[02 12 01] Telephone Conduit
[02 12 01 01] Demolition

Conduit Demolition

Length = 200 lf

Conduit Demolition = **200 LF**

Excavation

Depth = 5 ft
Width = 4 ft
Length = 200 lf

Excavation Volume = **148 CY**

[02 12 01 02] Relocation

Extra Excavation, Box Trench
Depth = 5 ft
Width = 4 ft
Length = 148 lf

Excavation Volume = **110 CY**

Extra Excavation, Top Edges (1.5:1)
Depth = 3 ft
Width = 4.5 ft
Length = 148 lf
# of Sides = 2 ea

Excavation Volume = **74 CY**

Trench Box
Depth = 7 ft
Length = 148 lf
# of Sides = 2 ea

Excavation Volume = **2,074 SF**

Backfill
Demo Excavation = 148 cy
Extra Excavation = 184 cy

Backfill Volume = **332 CY**

[02 12 02] 27" CMP
[02 12 02 01] Demolition

Pipe Demolition
Length = 35 lf

Pipe Demolition = **35 LF**

Excavation
Depth = 5 ft
Width = 5 ft
Length = 35 lf

Excavation Volume = **32 CY**

[02 12 02 02] Relocation

Extra Excavation, Box Trench
Depth = 5 ft
Width = 5 ft
Length = 35 lf

Excavation Volume = **32 CY**

Extra Excavation, Top Edges (1.5:1)
Depth = 3 ft
Width = 4.5 ft
Length = 35 lf
# of Sides = 2 ea

Excavation Volume = **18 CY**

Trench Box
Depth = 7 ft
Length = 35 lf
# of Sides = 2 ea

Excavation Volume = **490 SF**

Backfill
Demo Excavation = 32 cy
Extra Excavation = 50 cy

Backfill Volume = **82 CY**

Bedding Material
Depth = 1.5 ft
Length = 35 ft
Width = 3.0 ft

Bedding Volume = **5.8 CY**

[02 12 03] 13-1/0A SLCJ 21kv
[02 12 03 01] Demolition

Cable Demolition
Length = 70 lf
No. of Cables = 3 ea

Cable Demolition = **210 LF**

Excavation
Depth = 5 ft
Width = 4 ft
Length = 70 lf

Excavation Volume = **52 CY**

[02 12 03 02] Relocation

Extra Excavation, Box Trench
Depth = 5 ft
Width = 5 ft
Length = 70 lf

Excavation Volume = **65 CY**

Extra Excavation, Top Edges (1.5:1)
Depth = 3 ft
Width = 4.5 ft
Length = 70 lf
# of Sides = 2 ea

Excavation Volume = **35 CY**

Trench Box
Depth = 7 ft
Length = 70 lf
# of Sides = 2 ea

Excavation Volume = **980 SF**

Backfill
Demo Excavation = 52 cy
Extra Excavation = 100 cy

Backfill Volume = **152 CY**

Bedding Material
Depth = 1.5 ft
Length = 210 ft
Width = 3.0 ft

Bedding Volume = **35.0 CY**

[02 12 04] 3-700A and 1-350A Underground

[02 12 04 01] Demolition

Cable Demolition
Length = 160 lf
No. of Cables = 4 ea

Cable Demolition = **640 LF**

Excavation
Depth = 5 ft
Width = 4 ft
Length = 160 lf

Excavation Volume = **119 CY**

[02 12 04 02] Relocation

Extra Excavation, Box Trench
Depth = 5 ft
Width = 5 ft
Length = 160 lf

Excavation Volume = **148 CY**

Extra Excavation, Top Edges (1.5:1)
Depth = 3 ft
Width = 4.5 ft
Length = 160 lf
# of Sides = 2 ea

Excavation Volume = **80 CY**

Trench Box
Depth = 7 ft
Length = 160 lf
# of Sides = 2 ea

Excavation Volume = **2,240 SF**

Backfill
Demo Excavation = 119 cy
Extra Excavation = 228 cy

Backfill Volume = **347 CY**

[02 12 05] 12kv Underground Line

[02 12 05 01] Demolition

Line Demolition
Length = 550 lf

Line Demolition = **550 LF**

Excavation
Depth = 5 ft
Width = 4 ft
Length = 550 lf

Excavation Volume = **407 CY**

[02 12 05 02] Relocation

Extra Excavation, Box Trench
Depth = 5 ft
Width = 5 ft
Length = 550 lf

Excavation Volume = **509 CY**

Extra Excavation, Top Edges (1.5:1)
Depth = 3 ft
Width = 4.5 ft
Length = 550 lf
# of Sides = 2 ea

Excavation Volume = **275 CY**

Trench Box
Depth = 7 ft
Length = 550 lf
# of Sides = 2 ea

Excavation Volume = **7,700 SF**

Backfill
Demo Excavation = 407 cy
Extra Excavation = 784 cy

Backfill Volume = **1,192 CY**

[02 14 01] Underground Trench/Vault - STA 137+00

[02 14 01 01] Demolition

Underground Duct Demolition
Length = 110 lf

Duct Demolition = **110 LF**

Excavation
Depth = 5 ft
Width = 4 ft
Length = 110 lf

Excavation Volume = **81 CY**

[02 14 01 02] Relocation

Extra Excavation, Box Trench
Depth = 5 ft
Width = 5 ft
Length = 110 lf

Excavation Volume = **102 CY**

Extra Excavation, Top Edges (1.5:1)
Depth = 3 ft
Width = 4.5 ft
Length = 110 lf
# of Sides = 2 ea

Excavation Volume = **55 CY**

Trench Box
Depth = 7 ft
Length = 110 lf
# of Sides = 2 ea

Excavation Volume = **1,540 SF**

Backfill
Demo Excavation = 81 cy
Extra Excavation = 157 cy

Backfill Volume = **238 CY**

Bedding Material
Depth = .5 ft
Length = 110 ft
Width = 2.0 ft

Bedding Volume = **4.1 CY**

[02 14 02] 24" CMP
[02 14 02 01] Demolition

Pipe Demolition
Length = 45 lf

Pipe Demolition = **45 LF**

Excavation
Depth = 5 ft
Width = 4 ft
Length = 45 lf

Excavation Volume = **33 CY**

[02 14 02 02] Relocation

Extra Excavation, Box Trench
Depth = 5 ft
Width = 5 ft
Length = 45 lf

Excavation Volume = **42 CY**

Extra Excavation, Top Edges (1.5:1)
Depth = 3 ft
Width = 4.5 ft
Length = 45 lf
# of Sides = 2 ea

Excavation Volume = **23 CY**

Trench Box
Depth = 7 ft
Length = 45 lf
# of Sides = 2 ea

Excavation Volume = **630 SF**

Backfill
Demo Excavation = 33 cy
Extra Excavation = 64 cy

Backfill Volume = **98 CY**

Bedding Material
Depth = 1.0 ft
Length = 45 ft
Width = 3.0 ft

Bedding Volume = **5.0 CY**

[02 14 03] Underground 3-350A XLCJ 12kv

[02 14 03 01] Demolition

Cable Demolition
Length = 550 lf
No. of Cables = 3 ea

Cable Demolition = **1,650 LF**

Excavation
Depth = 5 ft
Width = 4 ft
Length = 550 lf

Excavation Volume = **407 CY**

[02 14 03 02] Relocation

Extra Excavation, Box Trench
Depth = 5 ft
Width = 5 ft
Length = 550 lf

Excavation Volume = **509 CY**

Extra Excavation, Top Edges (1.5:1)
Depth = 3 ft
Width = 4.5 ft
Length = 550 lf
# of Sides = 2 ea

Excavation Volume = **275 CY**

TETRA TECH, INC.

PROJECT: Berryessa Creek Flood Control
DETAIL: Detailed Quantity Take-Offs for Utility Relocations
COMPUTED BY: SKV JOB NO.: T26465
CHECKED BY: DATE: 12/31/2011

Trench Box

Depth = 7 ft
Length = 550 lf
# of Sides = 2 ea

Excavation Volume = **7,700 SF**

Backfill

Demo Excavation = 407 cy
Extra Excavation = 784 cy

Backfill Volume = **1,192 CY**

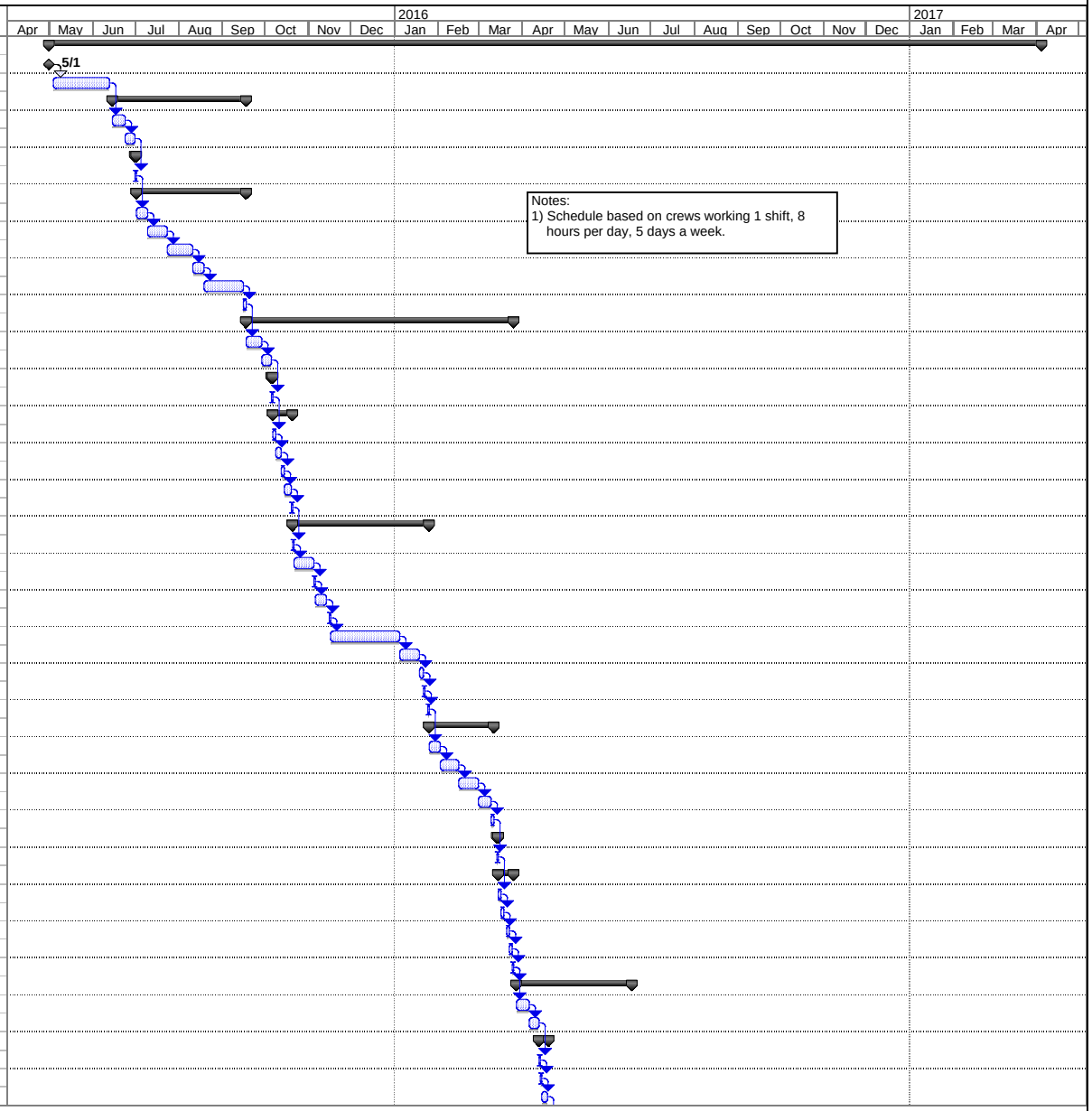
APPENDIX C

Tentative Construction Schedule

Berryessa Creek Flood Control
Tentative Construction Schedule

Thu 7/26/12

ID	Task Name	Duration	Start	Finish	Predecessors
1	**Berryessa Creek Construction**	**503 days**	**Fri 5/1/15**	**Tue 4/4/17**	
2	Notice to Proceed	0 days	Fri 5/1/15	Fri 5/1/15	
3	Mobilization / Demobilization	30 days	Mon 5/4/15	Fri 6/12/15	2FS+1 day
4	**Construction Phase 1 - Reaches 1-2**	**69 days**	**Mon 6/15/15**	**Thu 9/17/15**	
5	Dewatering	7 days	Mon 6/15/15	Tue 6/23/15	3
6	Clearing and Grubing	5 days	Wed 6/24/15	Tue 6/30/15	5
7	**Reach 1**	**1 day**	**Wed 7/1/15**	**Wed 7/1/15**	
8	Excavate and Haul	1 day	Wed 7/1/15	Wed 7/1/15	6
9	**Reach 2**	**56 days**	**Thu 7/2/15**	**Thu 9/17/15**	
10	Excavate and Haul	6 days	Thu 7/2/15	Thu 7/9/15	8
11	Geotextile Fabric	10 days	Fri 7/10/15	Thu 7/23/15	10
12	Import and Place Riprap	12 days	Fri 7/24/15	Mon 8/10/15	11
13	Cellular Confinement System	6 days	Tue 8/11/15	Tue 8/18/15	12
14	CIP Concrete	20 days	Wed 8/19/15	Tue 9/15/15	13
15	Seeding	2 days	Wed 9/16/15	Thu 9/17/15	14
16	**Construction Phase 2 - Reaches 3-8**	**136 days**	**Fri 9/18/15**	**Fri 3/25/16**	
17	Dewatering	7 days	Fri 9/18/15	Mon 9/28/15	15
18	Clearing and Grubing	5 days	Tue 9/29/15	Mon 10/5/15	17
19	**Reach 3**	**1 day**	**Tue 10/6/15**	**Tue 10/6/15**	
20	Excavate and Haul	1 day	Tue 10/6/15	Tue 10/6/15	18
21	**Reach 4**	**10 days**	**Wed 10/7/15**	**Tue 10/20/15**	
22	Excavate and Haul	2 days	Wed 10/7/15	Thu 10/8/15	20
23	Geotextile Fabric	2 days	Fri 10/9/15	Mon 10/12/15	22
24	Import and Place Riprap	2 days	Tue 10/13/15	Wed 10/14/15	23
25	Cellular Confinement System	3 days	Thu 10/15/15	Mon 10/19/15	24
26	Seeding	1 day	Tue 10/20/15	Tue 10/20/15	25
27	**Reach 5**	**69 days**	**Wed 10/21/15**	**Mon 1/25/16**	
28	Excavate and Haul	1 day	Wed 10/21/15	Wed 10/21/15	26
29	Temporary Shoo Fly Structure	10 days	Thu 10/22/15	Wed 11/4/15	28
30	Demo, Haul and Dispose Rails	1 day	Thu 11/5/15	Thu 11/5/15	29
31	Demo, Haul and Dispose Timber	6 days	Fri 11/6/15	Fri 11/13/15	30
32	Excavate, Backfill and Compact	1 day	Mon 11/16/15	Mon 11/16/15	31
33	Construct Replacement Culvert	35 days	Tue 11/17/15	Mon 1/4/16	32
34	Construct Wingwalls & Headwalls	10 days	Tue 1/5/16	Mon 1/18/16	33
35	Reconstruct Rails and Ties	3 days	Tue 1/19/16	Thu 1/21/16	34
36	Import and place Riprap	1 day	Fri 1/22/16	Fri 1/22/16	35
37	Seeding	1 day	Mon 1/25/16	Mon 1/25/16	36
38	**Reach 6**	**34 days**	**Tue 1/26/16**	**Fri 3/11/16**	
39	Excavate and Haul	6 days	Tue 1/26/16	Tue 2/2/16	37
40	Geotextile Fabric	9 days	Wed 2/3/16	Mon 2/15/16	39
41	Import and Place Riprap	10 days	Tue 2/16/16	Mon 2/29/16	40
42	Cellular Confinement System	7 days	Tue 3/1/16	Wed 3/9/16	41
43	Seeding	2 days	Thu 3/10/16	Fri 3/11/16	42
44	**Reach 7**	**1 day**	**Mon 3/14/16**	**Mon 3/14/16**	
45	Excavate and Haul	1 day	Mon 3/14/16	Mon 3/14/16	43
46	**Reach 8**	**9 days**	**Tue 3/15/16**	**Fri 3/25/16**	
47	Excavate and Haul	2 days	Tue 3/15/16	Wed 3/16/16	45
48	Geotextile Fabric	2 days	Thu 3/17/16	Fri 3/18/16	47
49	Import and Place Riprap	2 days	Mon 3/21/16	Tue 3/22/16	48
50	Cellular Confinement System	2 days	Wed 3/23/16	Thu 3/24/16	49
51	Seeding	1 day	Fri 3/25/16	Fri 3/25/16	50
52	**Construction Phase 3 - Reaches 9-10**	**60 days**	**Mon 3/28/16**	**Fri 6/17/16**	**51**
53	Dewatering	7 days	Mon 3/28/16	Tue 4/5/16	51
54	Clearing and Grubbing	5 days	Wed 4/6/16	Tue 4/12/16	53
55	**Reach 9**	**5 days**	**Wed 4/13/16**	**Tue 4/19/16**	
56	Excavate and Haul	1 day	Wed 4/13/16	Wed 4/13/16	54
57	Excavate, Backfill and Compact	1 day	Thu 4/14/16	Thu 4/14/16	56
58	Sheet Piling	2 days	Fri 4/15/16	Mon 4/18/16	57

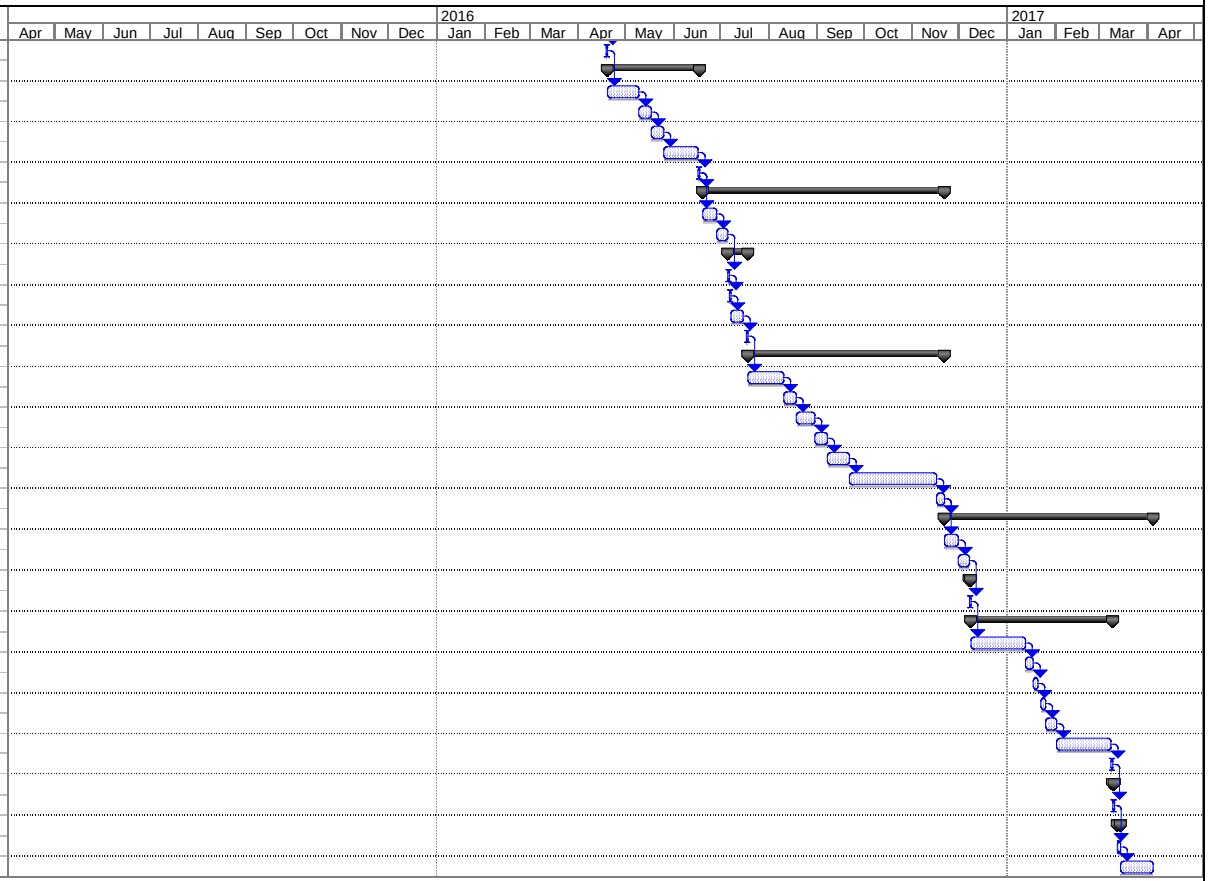


Task — Progress — Summary — External Tasks — Split
Split — Milestone — Project Summary — External MileTask

Berryessa Creek Flood Control
Tentative Construction Schedule

Thu 7/26/12

ID	Task Name	Duration	Start	Finish	Predecessors
59	Import and Place Riprap	1 day	Tue 4/19/16	Tue 4/19/16	58
60	**Reach 10**	**43 days**	**Wed 4/20/16**	**Fri 6/17/16**	
61	Excavate and Haul	14 days	Wed 4/20/16	Mon 5/9/16	59
62	Geotextile Fabric	6 days	Tue 5/10/16	Tue 5/17/16	61
63	Import and Place Riprap	6 days	Wed 5/18/16	Wed 5/25/16	62
64	Cellular Confinement System	16 days	Thu 5/26/16	Thu 6/16/16	63
65	Seeding	1 day	Fri 6/17/16	Fri 6/17/16	64
66	**Construction Phase 4 - Reaches 11-12**	**111 days**	**Mon 6/20/16**	**Mon 11/21/16**	**65**
67	Dewatering	7 days	Mon 6/20/16	Tue 6/28/16	65
68	Clearing and Grubbing	5 days	Wed 6/29/16	Tue 7/5/16	67
69	**Reach 11**	**9 days**	**Wed 7/6/16**	**Mon 7/18/16**	
70	Excavate and Haul	1 day	Wed 7/6/16	Wed 7/6/16	68
71	Excavate, Backfill and Compact	1 day	Thu 7/7/16	Thu 7/7/16	70
72	Sheet Piling	6 days	Fri 7/8/16	Fri 7/15/16	71
73	Import and Place Riprap	1 day	Mon 7/18/16	Mon 7/18/16	72
74	**Reach 12**	**90 days**	**Tue 7/19/16**	**Mon 11/21/16**	
75	Excavate and Haul	17 days	Tue 7/19/16	Wed 8/10/16	73
76	Geotextile Fabric	6 days	Thu 8/11/16	Thu 8/18/16	75
77	Import and Place Riprap	8 days	Fri 8/19/16	Tue 8/30/16	76
78	Cellular Confinement System	6 days	Wed 8/31/16	Wed 9/7/16	77
79	Access Road	10 days	Thu 9/8/16	Wed 9/21/16	78
80	CIP Concrete	40 days	Thu 9/22/16	Wed 11/16/16	79
81	Seeding	3 days	Thu 11/17/16	Mon 11/21/16	80
82	**Construction Phase 5 - Reaches 13-16**	**96 days**	**Tue 11/22/16**	**Tue 4/4/17**	**81**
83	Dewatering	7 days	Tue 11/22/16	Wed 11/30/16	81
84	Clearing and Grubbing	5 days	Thu 12/1/16	Wed 12/7/16	83
85	**Reach 13**	**1 day**	**Thu 12/8/16**	**Thu 12/8/16**	
86	Excavate and Haul	1 day	Thu 12/8/16	Thu 12/8/16	84
87	**Reach 14**	**65 days**	**Fri 12/9/16**	**Thu 3/9/17**	
88	Excavate and Haul	25 days	Fri 12/9/16	Thu 1/12/17	86
89	Geotextile Fabric	3 days	Fri 1/13/17	Tue 1/17/17	88
90	Import and Place Riprap	3 days	Wed 1/18/17	Fri 1/20/17	89
91	Cellular Confinement System	3 days	Mon 1/23/17	Wed 1/25/17	90
92	Access Road	5 days	Thu 1/26/17	Wed 2/1/17	91
93	CIP Concrete	25 days	Thu 2/2/17	Wed 3/8/17	92
94	Seeding	1 day	Thu 3/9/17	Thu 3/9/17	93
95	**Reach 15**	**1 day**	**Fri 3/10/17**	**Fri 3/10/17**	
96	Excavate and Haul	1 day	Fri 3/10/17	Fri 3/10/17	94
97	**Reach 16**	**2 days**	**Mon 3/13/17**	**Tue 3/14/17**	
98	Excavate and Haul	2 days	Mon 3/13/17	Tue 3/14/17	96
99	Demobilization	15 days	Wed 3/15/17	Tue 4/4/17	98



Task Progress Summary External Tasks Split
Split Milestone Project Summary External MileTask

APPENDIX D

Local Market Labor Rates

General Decision Number: CA120029 01/06/2012 CA29

Superseded General Decision Number: CA20100029

State: California

Construction Types: Building, Heavy (Heavy and Dredging) and Highway

Counties: Alameda, Calaveras, Contra Costa, Fresno, Kings, Madera, Mariposa, Merced, Monterey, San Benito, San Francisco, San Joaquin, San Mateo, Santa Clara, Santa Cruz, Stanislaus and Tuolumne Counties in California.

BUILDING CONSTRUCTION PROJECTS; DREDGING PROJECTS (does not include hopper dredge work); HEAVY CONSTRUCTION PROJECTS (does not include water well drilling); HIGHWAY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	01/06/2012

ASBE0016-001 08/01/2011

AREA 1: ALAMEDA, CONTRA COSTA, LAKE, MARIN, MENDOCINO, MONTEREY, NAPA, SAN BENITO, SAN FRANCISCO, SAN MATEO, SANTA CLARA, SANTA CRUZ, SOLANO, & SONOMA COUNTIES

AREA 2: ALPINE, AMADOR, BUTTE, CALAVERAS, COLUSA, DEL NORTE, EL DORADO, FRESNO, GLENN, HUMBOLDT, KINGS, LASSEN, MADERA, MARIPOSA, MERCED, MODOC, MONO, NEVADA, PLACER, PLUMAS, SACRAMENTO, SAN JOAQUIN, SHASTA, SIERRA, SISKIYOU, STANISLAU, SUTTER, TEHEMA, TRINITY, TULARE, TUOLUMNE, YOLO, & YUBA COUNTIES

	Rates	Fringes
Asbestos Workers/Insulator (Includes the application of all insulating materials, Protective Coverings, Coatings, and Finishes to all types of mechanical systems)		
Area 1	$ 53.05	17.25
Area 2	$ 41.40	17.25

ASBE0016-004 01/01/2010

	Rates	Fringes
Asbestos Removal worker/hazardous material handler (Includes preparation, wetting, stripping, removal, scrapping, vacuuming, bagging and disposing of all insulation materials from		

mechanical systems, whether
they contain asbestos or not)....$ 15.18 2.80

BOIL0549-001 01/01/2009

AREA 1: ALAMEDA, CONTRA COSTA, SAN FRANCISCO, SAN MATEO & SANTA CLARA COUNTIES

AREA 2: REMAINING COUNTIES

	Rates	Fringes
BOILERMAKER		
Area 1	$ 40.17	22.32
Area 2	$ 37.01	22.25

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* BRCA0003-001 06/01/2011

	Rates	Fringes
MARBLE FINISHER	$ 28.02	12.22

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* BRCA0003-003 06/01/2011

	Rates	Fringes
MARBLE MASON	$ 39.22	18.68

BRCA0003-005 05/01/2011

	Rates	Fringes
BRICKLAYER		
(1) Fresno, Kings, Madera, Mariposa, Merced	$ 34.11	19.34
(7) San Francisco, San Mateo	$ 39.85	22.00
(8) Alameda, Contra Costa, San Benito, Santa Clara	$ 39.63	19.92
(9) Calaveras, San Joaquin, Stanislaus, Toulumne	$ 35.11	18.99
(16) Monterey, Santa Cruz	$ 35.91	22.42

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* BRCA0003-008 06/01/2011

	Rates	Fringes
TERRAZZO FINISHER	$ 30.30	13.77
TERRAZZO WORKER/SETTER	$ 39.30	21.20

BRCA0003-011 01/01/2011

AREA 1: Alameda, Contra Costa, Monterey, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz

AREA 2: Calaveras, San Joaquin, Stanislaus, Tuolumne

AREA 3: Fresno, Kings, Madera, Mariposa, Merced

	Rates	Fringes
TILE FINISHER		
Area 1	$ 21.44	12.31
Area 2	$ 21.26	12.44
Area 3	$ 21.01	11.58
Tile Layer		
Area 1	$ 38.61	13.73
Area 2	$ 34.41	13.68
Area 3	$ 29.78	13.10

CARP0022-001 07/01/2011

San Francisco County

	Rates	Fringes
Carpenters		
Bridge Builder/Highway Carpenter	$ 37.50	24.84
Hardwood Floorlayer, Shingler, Power Saw Operator, Steel Scaffold & Steel Shoring Erector, Saw Filer	$ 37.65	24.84
Journeyman Carpenter	$ 37.50	24.84
Millwright	$ 37.60	26.43

CARP0034-001 07/01/2011

	Rates	Fringes
Diver		
Assistant Tender, ROV Tender/Technician	$ 36.75	28.04
Diver standby	$ 41.43	28.04
Diver Tender	$ 40.43	28.04
Diver wet	$ 82.86	28.04
Manifold Operator (mixed gas)	$ 45.43	28.04
Manifold Operator (Standby)	$ 40.43	28.04

DEPTH PAY (Surface Diving):
050 to 100 ft $2.00 per foot
101 to 150 ft $3.00 per foot
151 to 220 ft $4.00 per foot

SATURATION DIVING:
The standby rate shall apply until saturation starts. The saturation diving rate applies when divers are under pressure continuously until work task and decompression are complete. The diver rate shall be paid for all saturation hours.

DIVING IN ENCLOSURES:
Where it is necessary for Divers to enter pipes or tunnels, or other enclosures where there is no vertical ascent, the

following premium shall be paid: Distance traveled from entrance 26 feet to 300 feet: $1.00 per foot. When it is necessary for a diver to enter any pipe, tunnel or other enclosure less than 48" in height, the premium will be $1.00 per foot.

WORK IN COMBINATION OF CLASSIFICATIONS:
Employees working in any combination of classifications within the diving crew (except dive supervisor) in a shift are paid in the classification with the highest rate for that shift.

CARP0034-003 07/01/2011

	Rates	Fringes
Piledriver	$ 36.75	28.04

CARP0035-007 07/01/2010

AREA 1: Alameda, Contra Costa, San Francisco, San Mateo, Santa Clara counties

AREA 2: Monterey, San Benito, Santa Cruz Counties

AREA 3: Calaveras, Fresno, Kings, Madera, Mariposa, Merced, San Joaquin, Stanislaus, Tuolumne Counties

	Rates	Fringes
Modular Furniture Installer		
Area 1		
Installer I	$ 22.11	14.98
Installer II	$ 18.68	14.98
Lead Installer	$ 25.56	15.48
Master Installer	$ 29.78	15.48
Area 2		
Installer I	$ 19.46	14.98
Installer II	$ 16.51	14.89
Lead Installer	$ 22.43	15.48
Master Installer	$ 26.06	15.48
Area 3		
Installer I	$ 18.51	14.98
Installer II	$ 15.74	14.98
Lead Installer	$ 21.31	15.48
Master Installer	$ 24.73	15.48

CARP0035-008 08/01/2011

AREA 1: Alameda, Contra Costa, San Francisco, San Mateo, Santa Clara counties

AREA 2: Monterey, San Benito, Santa Cruz Counties

AREA 4: Calaveras, Fresno, Kings, Madera, Mariposa, Merced, San Joaquin, Stanislaus, Tuolumne Counties

	Rates	Fringes

Drywall Installers/Lathers:
Area 1.....$ 37.50 25.28
Area 2.....$ 31.62 25.28
Area 4.....$ 30.77 25.28
Drywall Stocker/Scrapper
Area 1.....$ 18.75 14.44
Area 2.....$ 15.81 14.44
Area 4.....$ 15.39 14.44

CARP0152-001 07/01/2011

Contra Costa County

	Rates	Fringes
Carpenters		
Bridge Builder/Highway Carpenter	$ 37.50	24.84
Hardwood Floorlayer, Shingler, Power Saw Operator, Steel Scaffold & Steel Shoring Erector, Saw Filer	$ 37.65	24.84
Journeyman Carpenter	$ 37.50	24.84
Millwright	$ 37.60	26.43

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* CARP0152-002 07/01/2011

San Joaquin County

	Rates	Fringes
Carpenters		
Bridge Builder/Highway Carpenter	$ 37.50	24.84
Hardwood Floorlayer, Shingler, Power Saw Operator, Steel Scaffold & Steel Shoring Erector, Saw Filer	$ 31.77	24.84
Journeyman Carpenter	$ 31.62	24.84
Millwright	$ 33.67	26.43

CARP0152-004 07/01/2011

Calaveras, Mariposa, Merced, Stanislaus and Tuolumne Counties

	Rates	Fringes
Carpenters		
Bridge Builder/Highway Carpenter	$ 37.50	24.84
Hardwood Floorlayer, Shingler, Power Saw Operator, Steel Scaffold & Steel Shoring Erector, Saw Filer	$ 30.42	24.84
Journeyman Carpenter	$ 30.27	24.84
Millwright	$ 32.77	26.43

CARP0217-001 07/01/2011

San Mateo County

	Rates	Fringes
Carpenters		
Bridge Builder/Highway		
Carpenter	$ 37.50	24.84
Hardwood Floorlayer, Shingler, Power Saw Operator, Steel Scaffold & Steel Shoring Erector, Saw Filer	$ 37.65	24.84
Journeyman Carpenter	$ 37.50	24.84
Millwright	$ 37.60	26.43

CARP0405-001 07/01/2011

Santa Clara County

	Rates	Fringes
Carpenters		
Bridge Builder/Highway		
Carpenter	$ 37.50	24.84
Hardwood Floorlayer, Shingler, Power Saw Operator, Steel Scaffold & Steel Shoring Erector, Saw Filer	$ 37.65	24.84
Journeyman Carpenter	$ 37.50	24.84
Millwright	$ 37.60	26.43

CARP0405-002 07/01/2011

San Benito County

	Rates	Fringes
Carpenters		
Bridge Builder/Highway		
Carpenter	$ 37.50	24.84
Hardwood Floorlayer, Shingler, Power Saw Operator, Steel Scaffold & Steel Shoring Erector, Saw Filer	$ 31.77	24.84
Journeyman Carpenter	$ 31.62	24.84
Millwright	$ 34.12	26.43

CARP0505-001 07/01/2011

Santa Cruz County

	Rates	Fringes
Carpenters		
Bridge Builder/Highway		

Carpenter	$ 37.50	24.84
Hardwood Floorlayer, Shingler, Power Saw Operator, Steel Scaffold & Steel Shoring Erector, Saw Filer	$ 31.77	24.84
Journeyman Carpenter	$ 31.62	24.84
Millwright	$ 34.12	26.43

CARP0605-001 07/01/2011

Monterey County

	Rates	Fringes
Carpenters		
Bridge Builder/Highway Carpenter	$ 37.50	24.84
Hardwood Floorlayer, Shingler, Power Saw Operator, Steel Scaffold & Steel Shoring Erector, Saw Filer	$ 31.77	24.84
Journeyman Carpenter	$ 31.62	24.84
Millwright	$ 34.12	26.43

CARP0701-001 07/01/2011

Fresno and Madera Counties

	Rates	Fringes
Carpenters		
Bridge Builder/Highway Carpenter	$ 37.50	24.84
Hardwood Floorlayer, Shingler, Power Saw Operator, Steel Scaffold & Steel Shoring Erector, Saw Filer	$ 30.42	24.84
Journeyman Carpenter	$ 30.27	24.84
Millwright	$ 32.77	26.43

CARP0713-001 07/01/2011

Alameda County

	Rates	Fringes
Carpenters		
Bridge Builder/Highway Carpenter	$ 37.50	24.84
Hardwood Floorlayer, Shingler, Power Saw Operator, Steel Scaffold & Steel Shoring Erector, Saw Filer	$ 37.65	24.84
Journeyman Carpenter	$ 37.50	24.84
Millwright	$ 37.60	26.43

CARP1109-001 07/01/2011

Kings County

	Rates	Fringes
Carpenters		
Bridge Builder/Highway Carpenter	$ 37.50	24.84
Hardwood Floorlayer, Shingler, Power Saw Operator, Steel Scaffold & Steel Shoring Erector, Saw Filer	$ 30.42	24.84
Journeyman Carpenter	$ 30.27	24.84
Millwright	$ 32.77	26.43

ELEC0006-001 12/01/2010

ALAMEDA, CONTRA COSTA, MONTEREY, SAN BENITO, SAN FRANCISCO, SAN MATEO, SANTA CLARA, AND SANTA CRUZ COUNTIES

	Rates	Fringes
Sound & Communications		
Installer	$ 29.87	3%+12.95
Technician	$ 34.01	3%+12.95

SCOPE OF WORK: Including any data system whose only function is to transmit or receive information; excluding all other data systems or multiple systems which include control function or power supply; inclusion or exclusion of terminations and testings of conductors determined by their function; excluding fire alarm work when installed in raceways (including wire and cable pulling) and when performed on new or major remodel building projects or jobs for which the conductors for the fire alarm system are installed in conduit; excluding installation of raceway systems, line voltage work, industrial work, life-safety systems (all buildings having floors located more than 75' above the lowest floor level having building access); excluding energy management systems.

FOOTNOTE: Fire alarm work when installed in raceways (including wire and cable pulling), on projects which involve new or major remodel building construction, for which the conductors for the fire alarm system are installed in the conduit, shall be performed by the inside electrician.

ELEC0006-007 12/01/2010

SAN FRANCISCO COUNTY

	Rates	Fringes
ELECTRICIAN	$ 53.05	22.69

ELEC0006-008 12/01/2006

CALAVERAS, MARIPOSA, MERCED, SAN JOAQUIN, STANISLAUS AND
TUOLUMNE COUNTIES

	Rates	Fringes
Communications System		
Installer	$ 23.47	3%+10.65
Technician	$ 26.72	3%+10.65

SCOPE OF WORK: Including any data system whose only function is to transmit or receive information; excluding all other data systems or multiple systems which include control function or power supply; inclusion or exclusion of terminations and testings of conductors determined by their function; excluding fire alarm work when installed in raceways (including wire and cable pulling) and when performed on new or major remodel building projects or jobs for which the conductors for the fire alarm system are installed in conduit; excluding installation of raceway systems, line voltage work, industrial work, life-safety systems (all buildings having floors located more than 75' above the lowest floor level having building access); excluding energy management systems.

FOOTNOTE: Fire alarm work when installed in raceways (including wire and cable pulling), on projects which involve new or major remodel building construction, for which the conductors for the fire alarm system are installed in the conduit, shall be performed by the inside electrician.

ELEC0100-002 06/01/2011

FRESNO, KINGS, AND MADERA COUNTIES

	Rates	Fringes
ELECTRICIAN	$ 32.85	3%+16.30

ELEC0100-005 07/01/2011

FRESNO, KINGS, MADERA

	Rates	Fringes
Communications System		
Installer	$ 26.29	13.74
Technician	$ 29.93	13.85

SCOPE OF WORK
Includes the installation testing, service and maintenance, of the following systems which utilize the transmission and/or transference of voice, sound, vision and digital for commercial, education, security and entertainment purposes for the following: TV monitoring and surveillance, background-foreground music, intercom and telephone interconnect, inventory control systems, microwave transmission, multi-media, multiplex, nurse call system,

radio page, school intercom and sound, burglar alarms, and low voltage master clock systems.

A. SOUND AND VOICE TRANSMISSION/TRANSFERENCE SYSTEMS Background foreground music, Intercom and telephone interconnect systems, Telephone systems Nurse call systems, Radio page systems, School intercom and sound systems, Burglar alarm systems, Low voltage, master clock systems, Multi-media/multiplex systems, Sound and musical entertainment systems, RF systems, Antennas and Wave Guide,

B. FIRE ALARM SYSTEMS Installation, wire pulling and testing

C. TELEVISION AND VIDEO SYSTEMS Television monitoring and surveillance systems Video security systems, Video entertainment systems, Video educational systems, Microwave transmission systems, CATV and CCTV

D. SECURITY SYSTEMS Perimeter security systems Vibration sensor systems Card access systems Access control systems, Sonar/infrared monitoring equipment

E. COMMUNICATIONS SYSTEMS THAT TRANSMIT OR RECEIVE INFORMATION AND/OR CONTROL SYSTEMS THAT ARE INTRINSIC TO THE ABOVE LISTED SYSTEMS SCADA (Supervisory Control and Data Acquisition) PCM (Pulse Code Modulation) Inventory Control Systems, Digital Data Systems Broadband and Baseband and Carriers Point of Sale Systems, VSAT Data Systems Data Communication Systems RF and Remote Control Systems, Fiber Optic Data Systems

WORK EXCLUDED Raceway systems are not covered (excluding Ladder-Rack for the purpose of the above listed systems). Chases and/or nipples (not to exceed 10 feet) may be installed on open wiring systems. Energy management systems. SCADA (Supervisory Control and Data Acquisition) when not intrinsic to the above listed systems (in the scope). Fire alarm systems when installed in raceways (including wire and cable pulling) shall be performed at the electrician wage rate, when either of the following two (2) conditions apply:
1. The project involves new or major remodel building trades construction.
2. The conductors for the fire alarm system are installed in conduit.

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* ELEC0234-001 05/31/2011

MONTEREY, SAN BENITO AND SANTA CRUZ COUNTIES

	Rates	Fringes
ELECTRICIAN	$ 41.20	21.50

ELEC0302-001 06/01/2011

CONTRA COSTA COUNTY

	Rates	Fringes

CABLE SPLICER.....$ 52.49 3%+20.95
ELECTRICIAN.....$ 46.21 3%+20.95
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* ELEC0332-001 11/28/2011

SANTA CLARA COUNTY

	Rates	Fringes
CABLE SPLICER	$ 57.01	29.165
ELECTRICIAN	$ 49.57	28.14

FOOTNOTES: Work under compressed air or where gas masks are required, orwork on ladders, scaffolds, stacks, "Bosun's chairs," or other structures and where the workers are not protected by permanent guard rails at a distance of 40 to 60 ft. from the ground or supporting structures: to be paid one and one-half times the straight-time rate of pay.
Work on structures of 60 ft. or over (as described above): to be paid twice the straight-time rate of pay.

ELEC0595-001 06/01/2011

ALAMEDA COUNTY

	Rates	Fringes
CABLE SPLICER	$ 50.63	3%+25.43
ELECTRICIAN	$ 45.00	3%+25.43

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* ELEC0595-002 12/01/2011

CALAVERAS AND SAN JOAQUIN COUNTIES

	Rates	Fringes
CABLE SPLICER	$ 37.13	9.025%+9.09
ELECTRICIAN		
(1) Tunnel work	$ 34.65	9.025%+9.09
(2) All other work	$ 33.00	9.025%+9.09

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* ELEC0617-001 06/01/2011

SAN MATEO COUNTY

	Rates	Fringes
ELECTRICIAN	$ 50.00	23.14

ELEC0684-001 07/01/2010

MARIPOSA, MERCED, STANISLAUS AND TUOLUMNE COUNTIES

	Rates	Fringes
ELECTRICIAN	$ 34.60	3%+16.90

CABLE SPLICER = 110% of Journeyman Electrician

ELEC1245-001 06/01/2011

	Rates	Fringes
LINE CONSTRUCTION		
(1) Lineman; Cable splicer	$ 47.87	13.87
(2) Equipment specialist (operates crawler tractors, commercial motor vehicles, backhoes, trenchers, cranes (50 tons and below), overhead & underground distribution line equipment)	$ 38.23	12.80
(3) Groundman	$ 29.25	12.53
(4) Powderman	$ 42.75	12.97

HOLIDAYS: New Year's Day, M.L. King Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day and day after Thanksgiving, Christmas Day

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ELEV0008-001 01/01/2011

	Rates	Fringes
ELEVATOR MECHANIC	$ 56.14	21.785

FOOTNOTE:
PAID VACATION: Employer contributes 8% of regular hourly rate as vacation pay credit for employees with more than 5 years of service, and 6% for 6 months to 5 years of service.
PAID HOLIDAYS: New Years Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day, Friday after Thanksgiving, and Christmas Day.

ENGI0003-008 07/01/2009

	Rates	Fringes
Dredging: (DREDGING: CLAMSHELL & DIPPER DREDGING; HYDRAULIC SUCTION DREDGING:)		
AREA 1:		
(1) Leverman	$ 38.94	22.58
(2) Dredge Dozer; Heavy duty repairman	$ 33.98	22.58
(3) Booster Pump Operator; Deck Engineer; Deck mate; Dredge Tender; Winch Operator	$ 32.86	22.58
(4) Bargeman; Deckhand; Fireman; Leveehand; Oiler	$ 29.56	22.58
AREA 2:		
(1) Leverman	$ 40.94	22.58
(2) Dredge Dozer; Heavy duty repairman	$ 35.98	22.58
(3) Booster Pump Operator; Deck Engineer; Deck mate; Dredge Tender; Winch		

Operator	$ 34.86	22.58
(4) Bargeman; Deckhand; Fireman; Leveehand; Oiler	$ 31.56	22.58

AREA DESCRIPTIONS

AREA 1: ALAMEDA,BUTTE, CONTRA COSTA, KINGS, MARIN, MERCED, NAPA, SACRAMENTO, SAN BENITO, SAN FRANCISCO, SAN JOAQUIN, SAN MATEO, SANTA CLARA, SANTA CRUZ, SOLANO, STANISLAUS, SUTTER, YOLO, AND YUBA COUNTIES

AREA 2: MODOC COUNTY

THE REMAINGING COUNTIES ARE SPLIT BETWEEN AREA 1 AND AREA 2 AS NOTED BELOW:

ALPINE COUNTY:
Area 1: Northernmost part
Area 2: Remainder

CALAVERAS COUNTY:
Area 1: Remainder
Area 2: Eastern part

COLUSA COUNTY:
Area 1: Eastern part
Area 2: Remainder

ELDORADO COUNTY:
Area 1: North Central part
Area 2: Remainder

FRESNO COUNTY:
Area 1: Remainder
Area 2: Eastern part

GLENN COUNTY:
Area 1: Eastern part
Area 2: Remainder

LASSEN COUNTY:
Area 1: Western part along the Southern portion of border with Shasta County
Area 2: Remainder

MADERA COUNTY:
Area 1: Except Eastern part
Area 2: Eastern part

MARIPOSA COUNTY
Area 1: Except Eastern part
Area 2: Eastern part

MONTERREY COUNTY
Area 1: Except Southwestern part
Area 2: Southwestern part

NEVADA COUNTY:
Area 1: All but the Northern portion along the border of Sierra County

Area 2: Remainder

PLACER COUNTY:
Area 1: Al but the Central portion
Area 2: Remainder

PLUMAS COUNTY:
Area 1: Western portion
Area 2: Remainder

SHASTA COUNTY:
Area 1: All but the Northeastern corner
Area 2: Remainder

SIERRA COUNTY:
Area 1: Western part
Area 2: Remainder

SISKIYOU COUNTY:
Area 1: Central part
Area 2: Remainder

SONOMA COUNTY:
Area 1: All but the Northwestern corner
Area 2: Remainder

TEHAMA COUNTY:
  Area 1: All but the Western border with Mendocino & Trinity
  Counties
Area 2: Remainder

TRINITY COUNTY:
  Area 1: East Central part and the Northeastern border with
  Shasta County
Area 2: Remainder

TUOLUMNE COUNTY:
Area 1: Except Eastern part
Area 2: Eastern part

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* ENGI0003-018 06/27/2011

"AREA 1" WAGE RATES ARE LISTED BELOW

"AREA 2" RECEIVES AN ADDITIONAL $2.00 PER HOUR ABOVE AREA 1
RATES.

SEE AREA DEFINITIONS BELOW

	Rates	Fringes
OPERATOR: Power Equipment (AREA 1:)		
GROUP 1	$ 37.77	27.52
GROUP 2	$ 36.24	27.52
GROUP 3	$ 34.76	27.52
GROUP 4	$ 33.38	27.52
GROUP 5	$ 32.11	27.52
GROUP 6	$ 30.79	27.52

GROUP 7.....$ 29.65 27.52
GROUP 8.....$ 28.51 27.52
GROUP 8-A.....$ 28.30 27.52
OPERATOR: Power Equipment
(Cranes and Attachments -
AREA 1:)
GROUP 1
Cranes.....$ 38.65 27.52
Oiler.....$ 29.39 27.52
Truck crane oiler.....$ 31.68 27.52
GROUP 2
Cranes.....$ 36.89 27.52
Oiler.....$ 29.18 27.52
Truck crane oiler.....$ 31.42 27.52
GROUP 3
Cranes.....$ 35.14 27.52
Hydraulic.....$ 30.79 27.52
Oiler.....$ 28.90 27.52
Truck Crane Oiler.....$ 31.18 27.52
OPERATOR: Power Equipment
(Piledriving - AREA 1:)
GROUP 1
Lifting devices.....$ 38.99 27.52
Oiler.....$ 29.73 27.52
Truck crane oiler.....$ 32.01 27.52
GROUP 2
Lifting devices.....$ 37.17 27.52
Oiler.....$ 29.46 27.52
Truck Crane Oiler.....$ 31.76 27.52
GROUP 3
Lifting devices.....$ 35.49 27.52
Oiler.....$ 29.24 27.52
Truck Crane Oiler.....$ 31.47 27.52
GROUP 4.....$ 33.72 27.52
GROUP 5.....$ 31.08 27.52
GROUP 6.....$ 28.85 27.52
OPERATOR: Power Equipment
(Steel Erection - AREA 1:)
GROUP 1
Cranes.....$ 39.62 27.52
Oiler.....$ 30.07 27.52
Truck Crane Oiler.....$ 32.30 27.52
GROUP 2
Cranes.....$ 37.85 27.52
Oiler.....$ 29.80 27.52
Truck Crane Oiler.....$ 32.08 27.52
GROUP 3
Cranes.....$ 36.37 27.52
Hydraulic.....$ 31.42 27.52
Oiler.....$ 29.58 27.52
Truck Crane Oiler.....$ 31.81 27.52
GROUP 4.....$ 34.35 27.52
GROUP 5.....$ 33.05 27.52
OPERATOR: Power Equipment
(Tunnel and Underground Work
- AREA 1:)
SHAFTS, STOPES, RAISES:
GROUP 1.....$ 33.87 27.52
GROUP 1-A.....$ 36.34 27.52
GROUP 2.....$ 32.61 27.52

GROUP 3	$ 31.28	27.52
GROUP 4	$ 30.14	27.52
GROUP 5	$ 29.00	27.52
UNDERGROUND:		
GROUP 1	$ 33.77	27.52
GROUP 1-A	$ 36.34	27.52
GROUP 2	$ 32.51	27.52
GROUP 3	$ 31.18	27.52
GROUP 4	$ 30.04	27.52
GROUP 5	$ 28.90	27.52

FOOTNOTE: Work suspended by ropes or cables, or work on a Yo-Yo Cat: $.60 per hour additional.

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Operator of helicopter (when used in erection work); Hydraulic excavator, 7 cu. yds. and over; Power shovels, over 7 cu. yds.

GROUP 2: Highline cableway; Hydraulic excavator, 3-1/2 cu. yds. up to 7 cu. yds.; Licensed construction work boat operator, on site; Power blade operator (finish); Power shovels, over 1 cu. yd. up to and including 7 cu. yds. m.r.c.

GROUP 3: Asphalt milling machine; Cable backhoe; Combination backhoe and loader over 3/4 cu. yds.; Continuous flight tie back machine assistant to engineer or mechanic; Crane mounted continuous flight tie back machine, tonnage to apply; Crane mounted drill attachment, tonnage to apply; Dozer, slope brd; Gradall; Hydraulic excavator, up to 3 1/2 cu. yds.; Loader 4 cu. yds. and over; Long reach excavator; Multiple engine scraper (when used as push pull); Power shovels, up to and including 1 cu. yd.; Pre-stress wire wrapping machine; Side boom cat, 572 or larger; Track loader 4 cu. yds. and over; Wheel excavator (up to and including 750 cu. yds. per hour)

GROUP 4: Asphalt plant engineer/box person; Chicago boom; Combination backhoe and loader up to and including 3/4 cu. yd.; Concrete batch plant (wet or dry); Dozer and/or push cat; Pull- type elevating loader; Gradesetter, grade checker (GPS, mechanical or otherwise); Grooving and grinding machine; Heading shield operator; Heavy-duty drilling equipment, Hughes, LDH, Watson 3000 or similar; Heavy-duty repairperson and/or welder; Lime spreader; Loader under 4 cu. yds.; Lubrication and service engineer (mobile and grease rack); Mechanical finishers or spreader machine (asphalt, Barber-Greene and similar); Miller Formless M-9000 slope paver or similar; Portable crushing and screening plants; Power blade support; Roller operator, asphalt; Rubber-tired scraper, self-loading (paddle-wheels, etc.); Rubber- tired earthmoving equipment (scrapers); Slip form paver (concrete); Small tractor with drag; Soil stabilizer (P & H or equal); Spider plow and spider puller; Tubex pile rig; Unlicensed constuction work boat operator, on site; Timber skidder; Track loader up to 4 yds.; Tractor-drawn scraper; Tractor, compressor drill

combination; Welder; Woods-Mixer (and other similar Pugmill equipment)

GROUP 5: Cast-in-place pipe laying machine; Combination slusher and motor operator; Concrete conveyor or concrete pump, truck or equipment mounted; Concrete conveyor, building site; Concrete pump or pumpcrete gun; Drilling equipment, Watson 2000, Texoma 700 or similar; Drilling and boring machinery, horizontal (not to apply to waterliners, wagon drills or jackhammers); Concrete mixer/all; Person and/or material hoist; Mechanical finishers (concrete) (Clary, Johnson, Bidwell Bridge Deck or similar types); Mechanical burm, curb and/or curb and gutter machine, concrete or asphalt); Mine or shaft hoist; Portable crusher; Power jumbo operator (setting slip-forms, etc., in tunnels); Screed (automatic or manual); Self-propelled compactor with dozer; Tractor with boom D6 or smaller; Trenching machine, maximum digging capacity over 5 ft. depth; Vermeer T-600B rock cutter or similar

GROUP 6: Armor-Coater (or similar); Ballast jack tamper; Boom- type backfilling machine; Assistant plant engineer; Bridge and/or gantry crane; Chemical grouting machine, truck-mounted; Chip spreading machine operator; Concrete saw (self-propelled unit on streets, highways, airports and canals); Deck engineer; Drilling equipment Texoma 600, Hughes 200 Series or similar up to and including 30 ft. m.r.c.; Drill doctor; Helicopter radio operator; Hydro-hammer or similar; Line master; Skidsteer loader, Bobcat larger than 743 series or similar (with attachments); Locomotive; Lull hi-lift or similar; Oiler, truck mounted equipment; Pavement breaker, truck-mounted, with compressor combination; Paving fabric installation and/or laying machine; Pipe bending machine (pipelines only); Pipe wrapping machine (tractor propelled and supported); Screed (except asphaltic concrete paving); Self- propelled pipeline wrapping machine; Soils & materials tester; Tractor; Self-loading chipper; Concrete barrier moving machine

GROUP 7: Ballast regulator; Boom truck or dual-purpose A-frame truck, non-rotating - under 15 tons; Truck-mounted rotating telescopic boom type lifting device, Manitex or similar (boom truck) - under 15 tons; Cary lift or similar; Combination slurry mixer and/or cleaner; Drilling equipment, 20 ft. and under m.r.c.; Firetender (hot plant); Grouting machine operator; Highline cableway signalperson; Stationary belt loader (Kolman or similar); Lift slab machine (Vagtborg and similar types); Maginnes internal full slab vibrator; Material hoist (1 drum); Mechanical trench shield; Pavement breaker with or without compressor combination); Pipe cleaning machine (tractor propelled and supported); Post driver; Roller (except asphalt); Chip Seal; Self-propelled automatically applied concrete curing mahcine (on streets, highways, airports and canals); Self-propelled compactor (without dozer); Signalperson; Slip-form pumps (lifting device for concrete forms); Tie spacer; Tower mobile; Trenching machine, maximum digging capacity up to and including 5 ft. depth; Truck- type loader

GROUP 8: Bit sharpener; Boiler tender; Box operator; Brakeperson; Combination mixer and compressor (shotcrete/gunite); Compressor operator; Deckhand; Fire tender; Forklift (under 20 ft.); Generator; Gunite/shotcrete equipment operator; Hydraulic monitor; Ken seal machine (or similar); Mixermobile; Oiler; Pump operator; Refrigeration plant; Reservoir-debris tug (self-propelled floating); Ross Carrier (construction site); Rotomist operator; Self-propelled tape machine; Shuttlecar; Self-propelled power sweeper operator (includes vacuum sweeper); Slusher operator; Surface heater; Switchperson; Tar pot firetender; Tugger hoist, single drum; Vacuum cooling plant; Welding machine (powered other than by electricity)

GROUP 8-A: Elevator operator; Skidsteer loader-Bobcat 743 series or smaller, and similar (without attachments); Mini excavator under 25 H.P. (backhoe-trencher); Tub grinder wood chipper

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ALL CRANES AND ATTACHMENTS

GROUP 1: Clamshell and dragline over 7 cu. yds.; Crane, over 100 tons; Derrick, over 100 tons; Derrick barge pedestal-mounted, over 100 tons; Self-propelled boom-type lifting device, over 100 tons

GROUP 2: Clamshell and dragline over 1 cu. yd. up to and including 7 cu. yds.; Crane, over 45 tons up to and including 100 tons; Derrick barge, 100 tons and under; Self-propelled boom-type lifting device, over 45 tons; Tower crane

GROUP 3: Clamshell and dragline up to and including 1 cu. yd.; Cranes 45 tons and under; Self-propelled boom-type lifting device 45 tons and under; Boom Truck or dual purpose A-frame truck, non-rotating over 15 tons; Truck-mounted rotating telescopic boom type lifting device, Manitex or similar (boom truck) over 15 tons;

PILEDRIVERS

GROUP 1: Derrick barge pedestal mounted over 100 tons; Clamshell over 7 cu. yds.; Self-propelled boom-type lifting device over 100 tons; Truck crane or crawler, land or barge mounted over 100 tons

GROUP 2: Derrick barge pedestal mounted 45 tons to and including 100 tons; Clamshell up to and including 7 cu. yds.; Self-propelled boom-type lifting device over 45 tons; Truck crane or crawler, land or barge mounted, over 45 tons up to and including 100 tons; Fundex F-12 hydraulic pile rig

GROUP 3: Derrick barge pedestal mounted under 45 tons; Self-propelled boom-type lifting device 45 tons and under; Skid/scow piledriver, any tonnage; Truck crane or crawler,

land or barge mounted 45 tons and under

GROUP 4: Assistant operator in lieu of assistant to engineer; Forklift, 10 tons and over; Heavy-duty repairperson/welder

GROUP 5: Deck engineer

GROUP 6: Deckhand; Fire tender

STEEL ERECTORS

GROUP 1: Crane over 100 tons; Derrick over 100 tons; Self-propelled boom-type lifting device over 100 tons

GROUP 2: Crane over 45 tons to 100 tons; Derrick under 100 tons; Self-propelled boom-type lifting device over 45 tons to 100 tons; Tower crane

GROUP 3: Crane, 45 tons and under; Self-propelled boom-type lifting device, 45 tons and under

GROUP 4: Chicago boom; Forklift, 10 tons and over; Heavy-duty repair person/welder

GROUP 5: Boom cat

TUNNEL AND UNDERGROUND WORK

GROUP 1-A: Tunnel bore machine operator, 20' diameter or more

GROUP 1: Heading shield operator; Heavy-duty repairperson; Mucking machine (rubber tired, rail or track type); Raised bore operator (tunnels); Tunnel mole bore operator

GROUP 2: Combination slusher and motor operator; Concrete pump or pumpcrete gun; Power jumbo operator

GROUP 3: Drill doctor; Mine or shaft hoist

GROUP 4: Combination slurry mixer cleaner; Grouting Machine operator; Motorman

GROUP 5: Bit Sharpener; Brakeman; Combination mixer and compressor (gunite); Compressor operator; Oiler; Pump operator; Slusher operator

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AREA DESCRIPTIONS:

POWER EQUIPMENT OPERATORS, CRANES AND ATTACHMENTS,TUNNEL AND UNDERGROUND [These areas do not apply to Piledrivers and Steel Erectors]

AREA 1: ALAMEDA, BUTTE, CONTRA COSTA, KINGS, MARIN, MERCED,

NAPA, SACRAMENTO, SAN BENITO, SAN FRANCISCO, SAN JOAQUIN,
SAN MATEO, SANTA CLARA, SANTA CRUZ, SOLANO, STANISLAUS,
SUTTER, YOLO, AND YUBA COUNTIES

AREA 2 - MODOC COUNTY

THE REMAINING COUNTIES ARE SPLIT BETWEEN AREA 1 AND AREA 2 AS
NOTED BELOW:

ALPINE COUNTY:
Area 1: Northernmost part
Area 2: Remainder

CALAVERAS COUNTY:
Area 1: Except Eastern part
Area 2: Eastern part

COLUSA COUNTY:
Area 1: Eastern part
Area 2: Remainder

DEL NORTE COUNTY:
Area 1: Extreme Southwestern corner
Area 2: Remainder

ELDORADO COUNTY:
Area 1: North Central part
Area 2: Remainder

FRESNO COUNTY
Area 1: Except Eastern part
Area 2: Eastern part

GLENN COUNTY:
Area 1: Eastern part
Area 2: Remainder

HUMBOLDT COUNTY:
Area 1: Except Eastern and Southwestern parts
Area 2: Remainder

LAKE COUNTY:
Area 1: Southern part
Area 2: Remainder

LASSEN COUNTY:
Area 1: Western part along the Southern portion of border
with Shasta County
Area 2: Remainder

MADERA COUNTY
Area 1: Remainder
Area 2: Eastern part

MARIPOSA COUNTY
Area 1: Remainder
Area 2: Eastern part

MENDOCINO COUNTY:
Area 1: Central and Southeastern parts

Area 2: Remainder

MONTEREY COUNTY
Area 1: Remainder
Area 2: Southwestern part

NEVADA COUNTY:
  Area 1: All but the Northern portion along the border of
  Sierra County
Area 2: Remainder

PLACER COUNTY:
Area 1: All but the Central portion
Area 2: Remainder

PLUMAS COUNTY:
Area 1: Western portion
Area 2: Remainder

SHASTA COUNTY:
Area 1: All but the Northeastern corner
Area 2: Remainder

SIERRA COUNTY:
Area 1: Western part
Area 2: Remainder

SISKIYOU COUNTY:
Area 1: Central part
Area 2: Remainder

SONOMA COUNTY:
Area 1: All but the Northwestern corner
Area 2: Reaminder

TEHAMA COUNTY:
  Area 1: All but the Western border with mendocino & Trinity
  Counties
Area 2: Remainder

TRINITY COUNTY:
  Area 1: East Central part and the Northeaster border with
  Shasta County
Area 2: Remainder

TULARE COUNTY;
Area 1: Remainder
Area 2: Eastern part

TUOLUMNE COUNTY:
Area 1: Remainder
Area 2: Eastern Part
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* ENGI0003-019 06/27/2011

SEE AREA DESCRIPTIONS BELOW

	Rates	Fringes
OPERATOR: Power Equipment		

(LANDSCAPE WORK ONLY)

GROUP 1		
AREA 1	$ 28.64	19.96
AREA 2	$ 30.64	19.96
GROUP 2		
AREA 1	$ 25.04	19.96
AREA 2	$ 27.04	19.96
GROUP 3		
AREA 1	$ 20.43	19.96
AREA 2	$ 22.43	19.96

GROUP DESCRIPTIONS:

GROUP 1: Landscape Finish Grade Operator: All finish grade work regardless of equipment used, and all equipment with a rating more than 65 HP.

GROUP 2: Landscape Operator up to 65 HP: All equipment with a manufacturer's rating of 65 HP or less except equipment covered by Group 1 or Group 3. The following equipment shall be included except when used for finish work as long as manufacturer's rating is 65 HP or less: A-Frame and Winch Truck, Backhoe, Forklift, Hydragraphic Seeder Machine, Roller, Rubber-Tired and Track Earthmoving Equipment, Skiploader, Straw Blowers, and Trencher 31 HP up to 65 HP.

GROUP 3: Landscae Utility Operator: Small Rubber-Tired Tractor, Trencher Under 31 HP.

AREA DESCRIPTIONS:

AREA 1: ALAMEDA, BUTTE, CONTRA COSTA, KINGS, MARIN, MERCED, NAPA, SACRAMENTO, SAN BENITO, SAN FRANCISCO, SAN JOAQUIN, SAN MATEO, SANTA CLARA, SANTA CRUZ, SOLANO, STANISLAUS, SUTTER, YOLO, AND YUBA COUNTIES

AREA 2 - MODOC COUNTY

THE REMAINING COUNTIES ARE SPLIT BETWEEN AREA 1 AND AREA 2 AS NOTED BELOW:

ALPINE COUNTY:
Area 1: Northernmost part
Area 2: Remainder

CALAVERAS COUNTY:
Area 1: Except Eastern part
Area 2: Eastern part

COLUSA COUNTY:
Area 1: Eastern part
Area 2: Remainder

DEL NORTE COUNTY:
Area 1: Extreme Southwestern corner
Area 2: Remainder

ELDORADO COUNTY:
Area 1: North Central part

Area 2: Remainder

FRESNO COUNTY
Area 1: Except Eastern part
Area 2: Eastern part

GLENN COUNTY:
Area 1: Eastern part
Area 2: Remainder

HUMBOLDT COUNTY:
Area 1: Except Eastern and Southwestern parts
Area 2: Remainder

LAKE COUNTY:
Area 1: Southern part
Area 2: Remainder

LASSEN COUNTY:
  Area 1: Western part along the Southern portion of border
  with Shasta County
Area 2: Remainder

MADERA COUNTY
Area 1: Remainder
Area 2: Eastern part

MARIPOSA COUNTY
Area 1: Remainder
Area 2: Eastern part

MENDOCINO COUNTY:
Area 1: Central and Southeastern parts
Area 2: Remainder

MONTEREY COUNTY
Area 1: Remainder
Area 2: Southwestern part

NEVADA COUNTY:
  Area 1: All but the Northern portion along the border of
  Sierra County
Area 2: Remainder

PLACER COUNTY:
Area 1: All but the Central portion
Area 2: Remainder

PLUMAS COUNTY:
Area 1: Western portion
Area 2: Remainder

SHASTA COUNTY:
Area 1: All but the Northeastern corner
Area 2: Remainder

SIERRA COUNTY:
Area 1: Western part
Area 2: Remainder

SISKIYOU COUNTY:
Area 1: Central part
Area 2: Remainder

SONOMA COUNTY:
Area 1: All but the Northwestern corner
Area 2: Reaminder

TEHAMA COUNTY:
  Area 1: All but the Western border with mendocino & Trinity
  Counties
Area 2: Remainder

TRINITY COUNTY:
  Area 1: East Central part and the Northeaster border with
  Shasta County
Area 2: Remainder

TULARE COUNTY;
Area 1: Remainder
Area 2: Eastern part

TUOLUMNE COUNTY:
Area 1: Remainder
Area 2: Eastern Part

IRON0002-004 07/01/2010

	Rates	Fringes
Ironworkers:		
Fence Erector	$ 26.58	15.26
Ornamental, Reinforcing and Structural	$ 33.00	23.73

PREMIUM PAY:

$6.00 additional per hour at the following locations:

China Lake Naval Test Station, Chocolate Mountains Naval Reserve-Niland,
Edwards AFB, Fort Irwin Military Station, Fort Irwin Training Center-Goldstone, San Clemente Island, San Nicholas Island, Susanville Federal Prison, 29 Palms - Marine Corps, U.S. Marine Base - Barstow, U.S. Naval Air Facility - Sealey, Vandenberg AFB

$4.00 additional per hour at the following locations:

Army Defense Language Institute - Monterey, Fallon Air Base, Naval Post Graduate School - Monterey, Yermo Marine Corps Logistics Center

$2.00 additional per hour at the following locations:

Port Hueneme, Port Mugu, U.S. Coast Guard Station - Two Rock

LABO0036-001 07/01/2007

SAN FRANCISCO AND SAN MATEO COUNTIES:

	Rates	Fringes
MASON TENDER, BRICK	$ 26.93	16.50

FOOTNOTES: Underground work such as sewers, manholes, catch basins, sewer pipes, telephone conduits, tunnels and cut trenches: $5.00 per day additional. Work in live sewage: $2.50 per day additional.

LABO0036-002 07/01/2007

SAN FRANCISCO AND SAN MATEO COUNTIES:

	Rates	Fringes
PLASTER TENDER	$ 26.48	16.23

FOOTNOTES: Work on a suspended scaffold: $5.00 per day additional. Work operating a plaster mixer pump gun: $1.00 per hour additional.

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* LABO0067-002 04/01/2010

AREA "A" - ALAMEDA, CONTRA COSTA, MARIN, SAN FRANCISCO, SAN MATEO AND SANTA CLARA COUNTIES

AREA "B" - ALPINE, AMADOR, BUTTE, CALAVERAS, COLUSA, DEL NORTE, EL DORADO, FRESNO, GLENN, HUMBOLDT, KINGS, LAKE, LASSEN, MADERA, MARIPOSA, MENDOCINO, MERCED, MODOC, MONTEREY, NAPA, NEVADA, PLACER, PLUMAS, SACRAMENTO, SAN BENITO, SAN JOAQUIN, SANTA CRUZ, SHASTA, SIERRA, SISKIYOU, SOLANO, SONOMA, STANISLAUS, SUTTER, TEHAMA, TRINITY, TULARE, TUOLUMNE, YOLO AND YUBA COUNTIES

	Rates	Fringes
Asbestos Removal Laborer		
Areas A & B	$ 18.68	5.88
LABORER (Lead Removal)		
Area A	$ 36.25	5.94
Area B	$ 35.25	5.94

ASBESTOS REMOVAL-SCOPE OF WORK: Site mobilization; initial site clean-up; site preparation; removal of asbestos-containing materials from walls and ceilings; or from pipes, boilers and mechanical systems only if they are being scrapped; encapsulation, enclosure and disposal of asbestos-containing materials by hand or with equipment or machinery; scaffolding; fabrication of temporary wooden barriers; and assembly of decontamination stations.

LABO0067-003 07/01/2009

AREA A: ALAMEDA, CONTRA COSTA, MARIN, SAN FRANCISCO, SAN MATEO & SANTA CLARA

AREA B: ALPINE, AMADOR, BUTTE, CALAVERAS, COLUSA, DEL NORTE, EL DORADO, FRESNO, GLENN, HUMBOLDT, KINGS, LAKE, LASSEN,

MADERA, MARIPOSA, MENOCINO, MERCED, MODOC, MONTEREY, NAPA, NEVADA, PLACER, PLUMAS, SANCRMENTO, SAN BENITO, SAN JOAQUIN, SANTA CRUZ, SIERRA, SHASTA, SISKIYOU, SOLANO, SONOMA, STANISLAUS,TEHAMA,TRINITY, TULARE, TUOLUMNE, YOLO & YUBA COUNTIES

	Rates	Fringes
LABORER (TRAFFIC CONTROL/LANE CLOSURE)		
Escort Driver, Flag Person		
Area A	$ 26.89	14.93
Area B	$ 25.89	14.93
Traffic Control Person I		
Area A	$ 27.19	14.93
Area B	$ 26.19	14.93
Traffic Control Person II		
Area A	$ 24.69	14.93
Area B	$ 23.69	14.93

TRAFFIC CONTROL PERSON I: Layout of traffic control, crash cushions, construction area and roadside signage.

TRAFFIC CONTROL PERSON II: Installation and removal of temporary/permanent signs, markers, delineators and crash cushions.

LABO0067-006 06/28/2010

AREA "A" - ALAMEDA, CONTRA COSTA, MARIN, SAN FRANCISCO, SAN MATEO AND SANTA CLARA COUNTIES

AREA "B" - ALPINE, AMADOR, BUTTE, CALAVERAS, COLUSA, EL DORADO, FRESNO, GLENN, KINGS, LASSEN, MADERA, MARIPOSA, MERCED, MODOC, MONTEREY, NAPA, NEVADA, PLACER, PLUMAS, SACRAMENTO, SAN BENITO, SAN JOAQUIN, SANTA CRUZ, SHASTA, SIERRA, SISKIYOU, SOLANO, SONOMA, STANISLAUS, SUTTER, TEHAMA, TRINITY, TULARE, TUOLUMNE, YOLO AND YUBA COUNTIES

	Rates	Fringes
Laborers: (CONSTRUCTION CRAFT LABORERS - AREA A:)		
Construction Specialist Group	$ 27.84	15.82
GROUP 1	$ 27.14	15.82
GROUP 1-a	$ 27.36	15.82
GROUP 1-c	$ 27.19	15.82
GROUP 1-e	$ 27.69	15.82
GROUP 1-f	$ 27.72	15.82
GROUP 1-g (Contra Costa County)	$ 27.34	15.82
GROUP 2	$ 26.99	15.82
GROUP 3	$ 26.89	15.82
GROUP 4	$ 20.58	15.82

See groups 1-b and 1-d under laborer classifications.

Laborers: (CONSTRUCTION CRAFT LABORERS - AREA B:)

Construction Specialist Group	$ 26.84	15.82
GROUP 1	$ 26.14	15.82
GROUP 1-a	$ 26.36	15.82
GROUP 1-c	$ 26.19	15.82
GROUP 1-e	$ 26.69	15.82
GROUP 1-f	$ 26.72	15.82
GROUP 2	$ 25.99	15.82
GROUP 3	$ 25.89	15.82
GROUP 4	$ 19.58	15.82

See groups 1-b and 1-d under laborer classifications.

Laborers: (GUNITE - AREA A:)		
GROUP 1	$ 28.10	15.82
GROUP 2	$ 27.60	15.82
GROUP 3	$ 27.60	15.82
GROUP 4	$ 27.60	15.82
Laborers: (GUNITE - AREA B:)		
GROUP 1	$ 27.10	15.82
GROUP 2	$ 26.60	15.82
GROUP 3	$ 26.01	15.82
GROUP 4	$ 25.89	15.82
Laborers: (WRECKING - AREA A:)		
GROUP 1	$ 27.14	15.82
GROUP 2	$ 26.99	15.82
Laborers: (WRECKING - AREA B:)		
GROUP 1	$ 26.14	15.82
GROUP 2	$ 25.99	15.82
Landscape Laborer (GARDENERS, HORTICULTURAL & LANDSCAPE LABORERS - AREA A:)		
(1) New Construction	$ 26.89	15.82
(2) Establishment Warranty Period	$ 20.58	15.82
Landscape Laborer (GARDENERS, HORTICULURAL & LANDSCAPE LABORERS - AREA B:)		
(1) New Construction	$ 25.89	15.82
(2) Establishment Warranty Period	$ 19.58	15.82

FOOTNOTES:

Laborers working off or with or from bos'n chairs, swinging scaffolds, belts shall receive $0.25 per hour above the applicable wage rate. This shall not apply to workers entitled to receive the wage rate set forth in Group 1-a below.

LABORER CLASSIFICATIONS

CONSTRUCTION SPECIALIST GROUP: Asphalt ironer and raker; Chainsaw; Laser beam in connection with laborers' work; Cast-in- place manhole form setter; Pressure pipelayer; Davis trencher - 300 or similar type (and all small trenchers); Blaster; Diamond driller; Multiple unit drill; Hydraulic drill

GROUP 1: Asphalt spreader boxes (all types); Barko, Wacker

and similar type tampers; Buggymobile; Caulker, bander, pipewrapper, conduit layer, plastic pipelayer; Certified hazardous waste worker including Leade Abatement; Compactors of all types; Concrete and magnesite mixer, 1/2 yd. and under; Concrete pan work; Concrete sander; Concrete saw; Cribber and/or shoring; Cut granite curb setter; Dri-pak-it machine; Faller, logloader and bucker; Form raiser, slip forms; Green cutter; Headerboard, Hubsetter, aligner, by any method; High pressure blow pipe (1-1/2" or over, 100 lbs. pressure/over); Hydro seeder and similar type; Jackhammer operator; Jacking of pipe over 12 inches; Jackson and similar type compactor; Kettle tender, pot and worker applying asphalt, lay-kold, creosote, lime, caustic and similar type materials (applying means applying, dipping or handling of such materials); Lagging, sheeting, whaling, bracing, trenchjacking, lagging hammer; Magnesite, epoxyresin, fiberglass, mastic worker (wet or dry); No joint pipe and stripping of same, including repair of voids; Pavement breaker and spader, including tool grinder; Perma curb; Pipelayer (including grade checking in connection with pipelaying); Precast-manhole setter; Pressure pipe tester; Post hole digger, air, gas and electric; Power broom sweeper; Power tampers of all types (except as shown in Group 2); Ram set gun and stud gun; Riprap stonepaver and rock-slinger, including placing of sacked concrete and/or sand (wet or dry) and gabions and similar type; Rotary scarifier or multiple head concrete chipping scarifier; Roto and Ditch Witch; Rototiller; Sandblaster, pot, gun, nozzle operators; Signalling and rigging; Tank cleaner; Tree climber; Turbo blaster; Vibrascreed, bull float in connection with laborers' work; Vibrator; Hazardous waste worker (lead removal); Asbestos and mold removal worker

GROUP 1-a: Joy drill model TWM-2A; Gardner-Denver model DH143 and similar type drills; Track driller; Jack leg driller; Wagon driller; Mechanical drillers, all types regardless of type or method of power; Mechanical pipe layers, all types regardless of type or method of power; Blaster and powder; All work of loading, placing and blasting of all powder and explosives of whatever type regardless of method used for such loading and placing; High scalers (including drilling of same); Tree topper; Bit grinder

GROUP 1-b: Sewer cleaners shall receive $4.00 per day above Group 1 wage rates. "Sewer cleaner" means any worker who handles or comes in contact with raw sewage in small diameter sewers. Those who work inside recently active, large diameter sewers, and all recently active sewer manholes shal receive $5.00 per day above Group 1 wage rates.

GROUP 1-c: Burning and welding in connection with laborers' work; Synthetic thermoplastics and similar type welding

GROUP 1-d: Maintenance and repair track and road beds. All employees performing work covered herein shall receive $ .25 per hour above their regular rate for all work performed on underground structures not specifically covered herein. This paragraph shall not be construed to

apply to work below ground level in open cut. It shall apply to cut and cover work of subway construction after the temporary cover has been placed.

GROUP 1-e: Work on and/or in bell hole footings and shafts thereof, and work on and in deep footings. (A deep footing is a hole 15 feet or more in depth.) In the event the depth of the footing is unknown at the commencement of excavation, and the final depth exceeds 15 feet, the deep footing wage rate would apply to all employees for each and every day worked on or in the excavation of the footing from the date of inception.

GROUP 1-f: Wire winding machine in connection with guniting or shot crete

GROUP 1-g, CONTRA COSTA COUNTY: Pipelayer (including grade checking in connection with pipelaying); Caulker; Bander; Pipewrapper; Conduit layer; Plastic pipe layer; Pressure pipe tester; No joint pipe and stripping of same, including repair of voids; Precast manhole setters, cast in place manhole form setters

GROUP 2: Asphalt shoveler; Cement dumper and handling dry cement or gypsum; Choke-setter and rigger (clearing work); Concrete bucket dumper and chute; Concrete chipping and grinding; Concrete laborer (wet or dry); Driller tender, chuck tender, nipper; Guinea chaser (stake), grout crew; High pressure nozzle, adductor; Hydraulic monitor (over 100 lbs. pressure); Loading and unloading, carrying and hauling of all rods and materials for use in reinforcing concrete construction; Pittsburgh chipper and similar type brush shredders; Sloper; Single foot, hand-held, pneumatic tamper; All pneumatic, air, gas and electric tools not listed in Groups 1 through 1-f; Jacking of pipe - under 12 inches

GROUP 3: Construction laborers, including bridge and general laborer; Dump, load spotter; Flag person; Fire watcher; Fence erector; Guardrail erector; Gardener, horticultural and landscape laborer; Jetting; Limber, brush loader and piler; Pavement marker (button setter); Maintenance, repair track and road beds; Streetcar and railroad construction track laborer; Temporary air and water lines, Victaulic or similar; Tool room attendant (jobsite only)

GROUP 4: Final clean-up work of debris, grounds and building including but not limited to: street cleaner; cleaning and washing windows; brick cleaner (jobsite only); material cleaner (jobsite only). The classification "material cleaner" is to be utilized under the following conditions:
A: at demolition site for the salvage of the material.
B: at the conclusion of a job where the material is to be salvaged and stocked to be reused on another job.
C: for the cleaning of salvage material at the jobsite or temporary jobsite yard.

The material cleaner classification should not be used in the performance of "form stripping, cleaning and oiling and moving to the next point of erection".

GUNITE LABORER CLASSIFICATIONS

GROUP 1: Structural Nozzleman

GROUP 2: Nozzleman, Gunman, Potman, Groundman

GROUP 3: Reboundman

GROUP 4: Gunite laborer

WRECKING WORK LABORER CLASSIFICATIONS

GROUP 1: Skilled wrecker (removing and salvaging of sash, windows and materials)

GROUP 2: Semi-skilled wrecker (salvaging of other building materials)

LABO0067-010 07/01/2010

	Rates	Fringes
Tunnel and Shaft Laborers:		
GROUP 1	$ 33.35	16.08
GROUP 2	$ 33.12	16.08
GROUP 3	$ 32.87	16.08
GROUP 4	$ 32.42	16.08
GROUP 5	$ 31.88	16.08
Shotcrete Specialist	$ 33.87	16.08

TUNNEL AND SHAFT CLASSIFICATIONS

GROUP 1: Diamond driller; Groundmen; Gunite and shotcrete nozzlemen

GROUP 2: Rodmen; Shaft work & raise (below actual or excavated ground level)

GROUP 3: Bit grinder; Blaster, driller, powdermen, heading; Cherry pickermen - where car is lifted; Concrete finisher in tunnel; Concrete screedman; Grout pumpman and potman; Gunite & shotcrete gunman & potman; Headermen; High pressure nozzleman; Miner - tunnel, including top and bottom man on shaft and raise work; Nipper; Nozzleman on slick line; Sandblaster - potman, Robotic Shotcrete Placer, Segment Erector, Tunnel Muck Hauler, Steel Form raiser and setter; Timberman, retimberman (wood or steel or substitute materials therefore); Tugger (for tunnel laborer work); Cable tender; Chuck tender; Powderman - primer house

GROUP 4: Vibrator operator, pavement breaker; Bull gang - muckers, trackmen; Concrete crew - includes rodding and spreading, Dumpmen (any method)

GROUP 5: Grout crew; Reboundman; Swamper/ Brakeman

LABO0073-003 07/01/2009

CALAVERAS, MARIPOSA, MERCED, MONTEREY, SAN BENITO, SAN JOAQUIN, STANISLAUS AND TUOLUMNE COUNTIES:

	Rates	Fringes
LABORER		
Mason Tender-Brick	$ 27.03	14.93

LABO0073-005 07/01/2009

CALAVERAS, FRESNO, KINGS, MADERA, MARIPOSA, MERCED, SAN JOAQUIN, STANISLAUS & TUOLUMNE

	Rates	Fringes
Plasterer tender	$ 28.37	14.14

LABO0166-001 07/01/2006

ALAMEDA AND CONTRA COSTA COUNTIES:

	Rates	Fringes
Brick Tender	$ 25.91	14.65

FOOTNOTES: Work on jobs where heat-protective clothing is required: $2.00 per hour additional. Work at grinders: $.25 per hour additional. Manhole work: $2.00 per day additional.

LABO0166-002 07/01/2006

ALAMEDA AND CONTRA COSTA COUNTIES:

	Rates	Fringes
Plasterer tender	$ 30.15	15.90

Gun Man $0.75 per hour additional

LABO0270-001 07/01/2008

SANTA CLARA & SANTA CRUZ COUNTIES

	Rates	Fringes
MASON TENDER, BRICK		
Santa Clara	$ 27.93	13.48
Santa Cruz	$ 26.93	13.48

FOOTNOTE: $2.00 per hour for refactory work where heat-protective clothing is required.

LABO0270-005 07/01/2007

SANTA CLARA AND SANTA CRUZ COUNTIES

	Rates	Fringes
PLASTER TENDER		
4 Stories and under	$ 27.62	13.73
5 Stories and above	$ 29.54	13.73

LABO0294-001 07/01/2009

FRESNO, KINGS AND MADERA COUNTIES

	Rates	Fringes
LABORER (Brick)		
Mason Tender-Brick	$ 27.03	14.93

LABO0297-001 08/01/2007

MONTEREY AND SAN BENITO COUNTIES

	Rates	Fringes
Plasterer tender	$ 23.70	11.50

FOOTNOTE: Mixer person: $4.00 per day additional.

PAIN0016-001 06/01/2011

ALAMEDA, CONTRA COSTA, MONTEREY, SAN BENITO, SAN MATEO, SANTA CLARA, AND SANTA CRUZ COUNTIES

	Rates	Fringes
Painters:	$ 32.71	19.16

PREMIUMS:

EXOTIC MATERIALS - $0.75 additional per hour.
SPRAY WORK: - $0.50 additional per hour.
INDUSTRIAL PAINTING - $0.25 additional per hour
[Work on industrial buildings used for the manufacture and processing of goods for sale or service; steel construction (bridges), stacks, towers, tanks, and similar structures]

HIGH WORK:
over 50 feet - $2.00 per hour additional
100 to 180 feet - $4.00 per hour additional
Over 180 feet - $6.00 per houir additional

PAIN0016-003 07/01/2011

AREA 1: ALAMEDA, CONTRA COSTA, SAN FRANCISCO, SAN MATEO & SANTA CLARA COUNTIES

AREA 2: CALAVERAS, MARIPOA, MERCED, MONTEREY, SAN BENITO, SAN JOAQUIN, SANTA CRUZ, STANISLAUS & TUOLUMNE COUNTIES

	Rates	Fringes

Drywall Finisher/Taper
AREA 1.....$ 40.37 19.47
AREA 2.....$ 36.24 18.07

PAIN0016-012 07/01/2011

ALAMEDA, CONTRA COSTA, MARIPOSA, MERCED, MONTEREY, SAN BENITO, SAN FRANCISCO, SAN MATEO, SANTA CLARA AND SANTA CRUZ COUNTIES

	Rates	Fringes
SOFT FLOOR LAYER	$ 44.87	17.11

PAIN0016-015 01/01/2011

CALAVERAS, MARIPOSA, MERCED, SAN JOAQUIN, STANISLAUS & TUOLUMNE COUNTIES

	Rates	Fringes
PAINTER	$ 27.78	15.27
Brush	$ 29.82	12.72

FOOTNOTES:
SPRAY/SANDBLAST: $0.50 additional per hour.
EXOTIC MATERIALS: $1.00 additional per hour.
HIGH TIME: Over 50 ft above ground or water level $2.00 additional per hour. 100 to 180 ft above ground or water level $4.00 additional per hour. Over 180 ft above ground or water level $6.00 additional per hour.

PAIN0016-022 06/01/2011

SAN FRANCISCO COUNTY

	Rates	Fringes
PAINTER	$ 36.33	19.16

PAIN0169-001 07/01/2011

FRESNO, KINGS, MADERA, MARIPOSA AND MERCED COUNTIES:

	Rates	Fringes
GLAZIER	$ 27.07	9.98

PAIN0169-005 07/01/2011

ALAMEDA CONTRA COSTA, MONTEREY, SAN BENITO, SAN FRANCISCO, SAN MATEO, SANTA CLARA & SANTA CRUZ COUNTIES

	Rates	Fringes
GLAZIER	$ 41.88	18.49

PAIN0294-004 07/01/2011

FRESNO, KINGS AND MADERA COUNTIES

	Rates	Fringes
PAINTER		
Brush, Roller	$ 25.67	14.57
Drywall Finisher/Taper	$ 30.47	15.57

FOOTNOTE:
Spray Painters & Paperhangers recive $1.00 additional per hour. Painters doing Drywall Patching receive $1.25 additional per hour. Lead Abaters & Sandblasters receive $1.50 additional per hour. High Time - over 30 feet (does not include work from a lift) $0.75 per hour additional.

PAIN0294-005 01/01/2011

FRESNO, KINGS & MADERA

	Rates	Fringes
SOFT FLOOR LAYER	$ 27.83	14.33

PAIN0767-001 07/01/2011

CALAVERAS, SAN JOAQUIN, STANISLAUS AND TUOLUMNE COUNTIES:

	Rates	Fringes
GLAZIER	$ 32.24	20.79

PAID HOLIDAYS: New Year's Day, Martin Luther King, Jr. Day, President's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, and Christmas Day.

Employee rquired to wear a body harness shall receive $1.50 per hour above the basic hourly rate at any elevation.

PAIN1176-001 07/01/2011

HIGHWAY IMPR0VEMENT

	Rates	Fringes
Parking Lot Striping/Highway Marking:		
GROUP 1	$ 31.35	11.65
GROUP 2	$ 26.65	11.65
GROUP 3	$ 26.96	11.65

CLASSIFICATIONS

GROUP 1: Striper: Layout and application of painted traffic stripes and marking; hot thermo plastic; tape, traffic stripes and markings

GROUP 2: Gamecourt & Playground Installer

GROUP 3: Protective Coating, Pavement Sealing

PAIN1237-003 07/01/2011

CALAVERAS; SAN JOAQUIN COUNTIES; STANISLAUS AND TUOLUMNE COUNTIES:

	Rates	Fringes
SOFT FLOOR LAYER	$ 28.25	16.42

* PLAS0066-002 08/01/2011

ALAMEDA, CONTRA COSTA, SAN MATEO AND SAN FRANCISCO COUNTIES:

	Rates	Fringes
PLASTERER	$ 33.13	24.64

PLAS0300-001 07/01/2009

	Rates	Fringes
PLASTERER		
AREA 188: Fresno	$ 29.72	14.21
AREA 224: San Benito, Santa Clara, Santa Cruz	$ 34.22	14.08
AREA 295: Calaveras & San Joaquin Couonties	$ 32.82	15.10
AREA 337: Monterey County	$ 31.01	13.93
AREA 429: Mariposa, Merced, Stanislaus, Tuolumne Counties	$ 32.82	15.30

PLAS0300-005 06/28/2010

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 28.65	18.56

PLUM0038-001 07/01/2011

SAN FRANCISCO COUNTY

	Rates	Fringes
PLUMBER (Plumber, Steamfitter, Refrigeration Fitter)	$ 57.75	39.74

PLUM0038-005 07/01/2011

SAN FRANCISCO COUNTY

	Rates	Fringes
Landscape/Irrigation Fitter (Underground/Utility Fitter)	$ 46.96	28.85

PLUM0062-001 10/01/2011

MONTEREY AND SANTA CRUZ COUNTIES

	Rates	Fringes
PLUMBER & STEAMFITTER	$ 40.55	22.45

PLUM0159-001 05/01/2011

CONTRA COSTA COUNTY

	Rates	Fringes
Plumber and steamfitter		
(1) Refrigeration	$ 49.33	26.39
(2) All other work	$ 50.22	26.64

PLUM0246-001 10/01/2011

FRESNO, KINGS & MADERA COUNTIES

	Rates	Fringes
PLUMBER & STEAMFITTER	$ 35.45	22.70

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* PLUM0246-004 10/01/2011

FRESNO, MERCED & SAN JOAQUIN COUNIES

	Rates	Fringes
PLUMBER (PIPE TRADESMAN)	$ 13.00	8.73

PIPE TRADESMAN SCOPE OF WORK:
Installation of corrugated metal piping for drainage, as well as installation of corrugated metal piping for culverts in connection with storm sewers and drains; Grouting, dry packing and diapering of joints, holes or chases including paving over joints, in piping; Temporary piping for dirt work for building site preparation; Operating jack hammers, pavement breakers, chipping guns, concrete saws and spades to cut holes, chases and channels for piping systems; Digging, grading, backfilling and ground preparation for all types of pipe to all points of the jobsite; Ground preparation including ground leveling, layout and planting of shrubbery, trees and ground cover, including watering, mowing, edging, pruning and fertilizing, the breaking of concrete, digging, backfilling and tamping for the preparation and completion of all work in connection with lawn sprinkler and landscaping; Loading, unloading and distributing materials at jobsite; Putting away materials in storage bins in jobsite secure storage area; Demolition of piping and fixtures for remodeling and additions; Setting up and tearing down work benches, ladders and job shacks; Clean-up and sweeping of jobsite; Pipe wrapping and waterproofing where tar or similar material is applied for protection of buried piping; Flagman

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PLUM0342-001 07/01/2011

ALAMEDA & CONTRA COSTA COUNTIES

	Rates	Fringes
PIPEFITTER		
CONTRA COSTA COUNTY	$ 51.21	29.79
PLUMBER, PIPEFITTER, STEAMFITTER		
ALAMEDA COUNTY	$ 51.21	29.79

PLUM0355-004 07/01/2011

ALAMEDA, CALAVERAS, CONTRA COSTA, FRESNO, KINGS, MADERA, MARIPOSA, MERCED, MONTEREY, SAN BENITO, SAN JOAQUIN, SAN MATEO, SANTA CLARA, SANTA CRUZ, STANISLAUS, AND TUOLUMNE COUNTIES:

	Rates	Fringes
Underground Utility Worker /Landscape Fitter	$ 28.20	7.65

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* PLUM0393-001 07/01/2011

SAN BENITO AND SANTA CLARA COUNTIES

	Rates	Fringes
PLUMBER/PIPEFITTER	$ 53.66	25.83

PLUM0442-001 10/01/2011

CALAVERAS, MARIPOSA, MERCED, SAN JOAQUIN, STANISLAUS & TUOLUMNE COUNTIES

	Rates	Fringes
PLUMBER & STEAMFITTER	$ 35.95	22.55

PLUM0467-001 05/01/2011

SAN MATEO COUNTY

	Rates	Fringes
Plumber/Pipefitter/Steamfitter	$ 53.90	25.61

ROOF0027-002 09/01/2010

FRESNO, KINGS, AND MADERA COUNTIES

	Rates	Fringes
ROOFER	$ 27.65	8.07

FOOTNOTE: Work with pitch, pitch base of pitch impregnated products or any material containing coal tar pitch, on any building old or new, where both asphalt and pitchers are

used in the application of a built-up roof or tear off:
$2.00 per hour additional.

ROOF0040-002 08/01/2010

SAN FRANCISCO & SAN MATEO COUNTIES:

	Rates	Fringes
ROOFER	$ 33.33	11.04

ROOF0081-001 08/01/2010

ALAMEDA AND CONTRA COSTA COUNTIES:

	Rates	Fringes
Roofer	$ 34.06	9.54

ROOF0081-004 08/01/2011

CALAVERAS, MARIPOSA, MERCED, SAN JOAQUIN, STANISLAUS AND TUOLUMNE COUNTIES:

	Rates	Fringes
ROOFER	$ 28.49	10.75

ROOF0095-002 08/01/2011

MONTEREY, SAN BENITO, SANTA CLARA, AND SANTA CRUZ COUNTIES:

	Rates	Fringes
ROOFER		
Journeyman	$ 35.58	10.90
Kettle person (2 kettles); Bitumastic, Enameler, Coal Tar, Pitch and Mastic worker	$ 35.58	10.90
Kettleman (2 kettles), Bitumastic Enameler, Coal Tar, Pitch & Mastic	$ 33.73	9.89

SFCA0483-001 08/01/2011

ALAMEDA, CONTRA COSTA, SAN FRANCISCO, SAN MATEO AND SANTA CLARA COUNTIES:

	Rates	Fringes
SPRINKLER FITTER (FIRE)	$ 50.59	23.70

SFCA0669-011 04/01/2011

CALAVERAS, FRESNO, KINGS, MADERA, MARIPOSA, MERCED, MONTEREY, SAN BENITO, SAN JOAQUIN, SANTA CRUZ, STANISLAUS AND TUOLUMNE COUNTIES:

	Rates	Fringes
SPRINKLER FITTER	$ 33.35	17.75

* SHEE0104-001 07/01/2011

AREA 1: ALAMEDA, CONTRA COSTA, SAN FRANCISCO, SAN MATEO, SANTA CLARA

AREA 2: MONTEREY & SAN BENITO

AREA 3: SANTA CRUZ

	Rates	Fringes
SHEET METAL WORKER		
AREA 1:		
Mechanical Contracts		
under $200,000	$ 42.47	31.25
All Other Work	$ 46.85	31.55
AREA 2	$ 36.35	28.16
AREA 3	$ 38.45	26.06

* SHEE0104-015 07/01/2011

ALAMEDA, CONTRA COSTA, MONTEREY, SAN BENITO, SAN FRANCISCO, SAN MATEO, SANTA CLARA AND SANTA CRUZ COUNTIES:

	Rates	Fringes
SHEET METAL WORKER (Metal Decking and Siding only)	$ 32.43	28.66

SHEE0162-001 07/01/2011

CALAVERAS AND SAN JOAQUIN COUNTIES:

	Rates	Fringes
SHEET METAL WORKER	$ 33.71	22.79

SHEE0162-003 07/01/2011

MARIPOSA, MERCED, STANISLAUS AND TUOLUMNE COUNTIES:

	Rates	Fringes
SHEET METAL WORKER (Excluding metal deck and siding)	$ 34.64	24.91

SHEE0162-004 07/01/2011

FRESNO, KINGS, AND MADERA COUNTIES:

	Rates	Fringes

SHEET METAL WORKER.....$ 34.32 25.50

SHEE0162-013 07/01/2011

CALAVERAS, FRESNO, KINGS, MADERA, MARIPOSA, MERCED, SAN JOAQUIN, STANISLAUS AND TUOLUMNE COUNTIES:

	Rates	Fringes
Sheet metal worker (Metal decking and siding only)	$ 34.31	26.78

TEAM0094-001 07/01/2009

	Rates	Fringes
Truck drivers:		
GROUP 1	$ 27.13	18.99
GROUP 2	$ 27.43	18.99
GROUP 3	$ 27.73	18.99
GROUP 4	$ 28.08	18.99
GROUP 5	$ 28.43	18.99

FOOTNOTES:

Articulated dump truck; Bulk cement spreader (with or without auger); Dumpcrete truck; Skid truck (debris box); Dry pre-batch concrete mix trucks; Dumpster or similar type; Slurry truck: Use dump truck yardage rate.

Heater planer; Asphalt burner; Scarifier burner; Industrial lift truck (mechanical tailgate); Utility and clean-up truck: Use appropriate rate for the power unit or the equipment utilized.

TRUCK DRIVER CLASSIFICATIONS

GROUP 1: Dump trucks, under 6 yds.; Single unit flat rack (2-axle unit); Nipper truck (when flat rack truck is used appropriate flat rack shall apply); Concrete pump truck (when flat rack truck is used appropriate flat rack shall apply); Concrete pump machine; Fork lift and lift jitneys; Fuel and/or grease truck driver or fuel person; Snow buggy; Steam cleaning; Bus or personhaul driver; Escort or pilot car driver; Pickup truck; Teamster oiler/greaser and/or serviceperson; Hook tender (including loading and unloading); Team driver; Tool room attendant (refineries)

GROUP 2: Dump trucks, 6 yds. and under 8 yds.; Transit mixers, through 10 yds.; Water trucks, under 7,000 gals.; Jetting trucks, under 7,000 gals.; Single-unit flat rack (3-axle unit); Highbed heavy duty transport; Scissor truck; Rubber-tired muck car (not self-loaded); Rubber-tired truck jumbo; Winch truck and "A" frame drivers; Combination winch truck with hoist; Road oil truck or bootperson; Buggymobile; Ross, Hyster and similar straddle carriers; Small rubber-tired tractor

GROUP 3: Dump trucks, 8 yds. and including 24 yds.; Transit mixers, over 10 yds.; Water trucks, 7,000 gals. and over;

Jetting trucks, 7,000 gals. and over; Vacuum trucks under 7500 gals. Trucks towing tilt bed or flat bed pull trailers; Lowbed heavy duty transport; Heavy duty transport tiller person; Self- propelled street sweeper with self-contained refuse bin; Boom truck - hydro-lift or Swedish type extension or retracting crane; P.B. or similar type self-loading truck; Tire repairperson; Combination bootperson and road oiler; Dry distribution truck (A bootperson when employed on such equipment, shall receive the rate specified for the classification of road oil trucks or bootperson); Ammonia nitrate distributor, driver and mixer; Snow Go and/or plow

GROUP 4: Dump trucks, over 25 yds. and under 65 yds.; Water pulls - DW 10's, 20's, 21's and other similar equipment when pulling Aqua/pak or water tank trailers; Helicopter pilots (when transporting men and materials); Lowbedk Heavy Duty Transport up to including 7 axles; DW10's, 20's, 21's and other similar Cat type, Terra Cobra, LeTourneau Pulls, Tournorocker, Euclid and similar type equipment when pulling fuel and/or grease tank trailers or other miscellaneous trailers; Vacuum Trucks 7500 gals and over and truck repairman

GROUP 5: Dump trucks, 65 yds. and over; Holland hauler; Low bed Heavy Duty Transport over 7 axles

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WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows indicates the local union number or district council number where applicable , i.e., Plumbers Local 0198. The next number, 005 in the

example, is an internal number used in processing the wage determination. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rate.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request

review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

APPENDIX E

Estimated Production Rates

TITLE:	Berryessa Creek Flood Control		
SUBJECT:	Output Rates for Loading, Hauling and Disposal of Concrete		
MADE BY:	SKV	JOB NO.:	T26465
CHECKED BY:		DATE:	8/15/2011

CSI TASK:

CONCRETE LOAD AND HAUL, SMALL QUANTITIES
16-cy Dump Truck, 5-mile Haul, 30-mph Avg.

CREW: *Load and Haul Concrete Crew* — 3 crew members

- 1 Equip. Oper. Heavy
- 1 Oiler
- 1 Truck Driver, Heavy
- 1 Front End Loader, 3-cy Bucket
- 1 16-cy Dump Truck

OVERALL PRODUCTION RATE → **10.5 cy/crew hr**

LOADING

SUB-CREW: Loading Crew — 2 crew members

- 1 Equip. Oper. Heavy
- 1 Oiler
- 1 Front End Loader, 3-cy Bucket

PRODUCTION

3	cy bucket
0.50	% fill
50	min/hr
0.75	cycle/min

56 cy/crew hr → 56 cy/crew hr

TITLE:	Berryessa Creek Flood Control		
SUBJECT:	Output Rates for Loading, Hauling and Disposal of Concrete		
MADE BY:	SKV	JOB NO.:	T26465
CHECKED BY:		DATE:	8/15/2011

HAUL TO DISPOSAL SITE

SUB-CREW: Truck Haul Crew — 1 crew members

1 Truck Driver, Heavy
1 16-cy Dump Truck

PRODUCTION

16	cy truck
0.50	% fill
17.1	min. for loading
5	mi. to disposal location
30	mph haul speed
8.5	min. dump time

Quantity per Truck 8.0 cy/truck

Duration of Round Trip 0.76 hr

10.5 cy/hr

1.00 Number of truck crews in order to have little to no back up on route

TITLE:	Berryessa Creek Flood Control		
SUBJECT:	Output Rates for Clearing and Grubbing		
MADE BY:	SKV	JOB NO.:	T26465
CHECKED BY:		DATE:	8/15/2011

Sheet No. 1 of 1

CLEARING AND GRUBBING
Medium Brush Including Trees

CREW: Clear and Grub Crew — 3 crew members

1 Equip. Oper. Medium
2 Laborers
2 Chainsaws
1 Dozer

480 min/acre

OVERALL PRODUCTION RATE **0.125 acre/hr**

TITLE:	Berryessa Creek Flood Control		
SUBJECT:	Output Rates for Loading, Hauling and Disposal of Rock		
MADE BY:	SKV	JOB NO.:	T26465
CHECKED BY:		DATE:	8/15/2011

Sheet No. 1 of 2

CSI TASK:

ROCK LOAD AND HAUL
16-cy Dump Truck, 5-mile Haul, 30-mph Avg.

CREW: *Rock Load and Haul Crew* — 6 crew members

1	Equip. Oper. Heavy
1	Oiler
4	Truck Driver, Heavy
1	Front End Loader, 3-cy Bucket
4	16-cy Dump Truck

OVERALL PRODUCTION RATE → **74 cy/crew hr**

LOADING

SUB-CREW: Loading Crew — 2 crew members

1	Equip. Oper. Heavy
1	Oiler
1	Front End Loader, 3-cy Bucket

PRODUCTION

3	cy bucket
0.70	% fill
50	min/hr
0.70	cycle/min

74 cy/crew hr → 74 cy/crew hr

HAUL TO DISPOSAL SITE

SUB-CREW: Truck Haul Crew — 1 crew members

1 Truck Driver, Heavy
1 16-cy Dump Truck

PRODUCTION

16	cy truck
0.80	% fill
13.1	min. for loading
5	mi. to disposal location
30	mph haul speed
6.5	min. dump time

Quantity per Truck 12.8 cy/truck

Duration of Round Trip 0.66 hr

19.4 cy/hr →

4.00 Number of truck crews in order to have little to no back up on route

TITLE: Berryessa Creek Flood Control
SUBJECT: Output Rates for Loading, Hauling and Disposal of Rock
MADE BY: SKV JOB NO.: T26465
CHECKED BY: DATE: 8/15/2011

Sheet No. 1 of 2

CSI TASK:

ROCK LOAD AND HAUL
16-cy Dump Truck, 5-mile Haul, 30-mph Avg.

CREW: *Rock Load and Haul Crew* — 6 crew members

1 Equip. Oper. Heavy
1 Oiler
4 Truck Driver, Heavy
1 Front End Loader, 3-cy Bucket
4 16-cy Dump Truck

OVERALL PRODUCTION RATE → **90 cy/crew hr**

LOADING

SUB-CREW: Loading Crew — 2 crew members

1 Equip. Oper. Heavy
1 Oiler
1 Front End Loader, 3-cy Bucket

PRODUCTION

3	cy bucket
0.80	% fill
50	min/hr
0.75	cycle/min

90 cy/crew hr → 90 cy/crew hr

HAUL TO DISPOSAL SITE

SUB-CREW: Truck Haul Crew — 1 crew members

1 Truck Driver, Heavy
1 16-cy Dump Truck

PRODUCTION

16	cy truck
0.50	% fill
10.7	min. for loading
5	mi. to disposal location
30	mph haul speed
5.3	min. dump time

Quantity per Truck 8.0 cy/truck

Duration of Round Trip 0.60 hr

13.3 cy/hr →

4.00 Number of truck crews in order to have little to no back up on route

TITLE: Berryessa Creek Flood Control
SUBJECT: Output Rates for Stone Placement
MADE BY: SKV
CHECKED BY:
JOB NO.: T26465
DATE: 8/15/2011

Sheet No. 1 of 1

RIPRAP

CREW:

Riprap Placement Crew — 5 crew members

2	Laborers
1	Labor Foreman
1	Oiler
1	Equip. Oper. Heavy
1	Hydraulic Excavator, 3-cy Bucket

PRODUCTION

3	cy bucket
0.75	% fill
50	min/hr
0.65	cycle/min
73	cy/crew hr

OVERALL PRODUCTION RATE → **73 cy/crew hr**

AGGREGATE BASE

CREW:

Aggregate Base Crew — 6 crew members

3	Equip. Oper. Medium
1	Labor Foreman
1	Laborers
1	Oiler
1	Vibratory Roller
1	Front End Loader, 3-cy Bucket
1	Grader

3	cy bucket
0.90	% fill
50	min/hr
0.80	cycle/min

OVERALL PRODUCTION RATE → **108 cy/hr**

CSI TASK:

FILL AND COMPACT FROM STOCKPILE
300-ft Haul , 3-cy Bucket, Vibro Compacted, with 3,000-gal Water Truck

CREW NAME: *Fill and Compact from Stockpile Crew* — 5.5 crew members

3	Eq. Oper. Med.
1.5	Laborers
1	Truck Driver, Heavy
1	Front End Loader 3-cy Bucket
1	Vibratory Roller, Double Drum
1	Dozer
1	Water Truck, 3000-gal

OVERALL PRODUCTION RATE → **84 cy/crew hr**

FILL FROM STOCKPILE

SUB-CREW: Fill From Stockpile Crew — 3 crew members

2	Eq. Oper. Med.
1	Laborer
1	Front End Loader, 3-cy Bucket
1	Dozer

PRODUCTION

3	cy bucket
0.80	% fill
50	min/hr
0.70	cycle/min

→ 84 cy/crew hr

COMPACT FILL

SUB-CREW: Compaction Crew — 1.5 crew members

0.5	Laborer
1	Equip. Oper. Medium
1	Vibratory Roller, Double Drum

PRODUCTION 0.24 min/cy → 250 cy/hr

0.34 crews/equipment members to match overall production rate

1.00 total number of crews needed

TITLE: Berryessa Creek Flood Control
SUBJECT: Output Rates for Fill and Compact From Stockpile
MADE BY: SKV
CHECKED BY:
JOB NO.: T26465
DATE: 8/15/2011

Sheet No. 2 of 2

WATER TRUCK

SUB-CREW:

Water Truck Crew — 1 crew members
1 Truck Driver, Heavy
1 Water Truck, 3000-gal

PRODUCTION

0.25 min/cy — 240 cy/hr →

0.35 crews/equipment members to match overall production rate

1.00 total number of crews needed

TITLE: Berryessa Creek Flood Control
SUBJECT: Output Rates for Top Soil Placement
MADE BY: SKV
CHECKED BY:
JOB NO.: T26465
DATE: 8/15/2011

CSI TASK:

FILL AND COMPACT FROM STOCKPILE
300-ft Haul , 3-cy Bucket, Vibro Compacted, with 3,000-gal Water Truck

CREW NAME: *Fill and Compact from Stockpile Crew* — 5 crew members

- 3 Eq. Oper. Med.
- 2 Laborers
- 1 Front End Loader 3-cy Bucket
- 1 Vibratory Roller, Double Drum
- 1 Dozer

OVERALL PRODUCTION RATE → **84 cy/crew hr**

FILL FROM STOCKPILE

SUB-CREW: Fill From Stockpile Crew — 3 crew members

- 2 Eq. Oper. Med.
- 1 Laborer
- 1 Front End Loader, 3-cy Bucket
- 1 Dozer

PRODUCTION

3	cy bucket
0.80	% fill
50	min/hr
0.70	cycle/min

→ 84 cy/crew hr

COMPACT FILL

SUB-CREW: Compaction Crew — 1.5 crew members

- 1 Laborer
- 1 Equip. Oper. Medium
- 1 Vibratory Roller, Double Drum

PRODUCTION 0.24 min/cy → 250 cy/hr

0.34 crews/equipment members to match overall production rate

1.00 total number of crews needed

TITLE: Berryessa Creek Flood Control
SUBJECT: Output Rates for Excavate, Load and Haul to Disposal Site
MADE BY: SKV JOB NO.: T26465
CHECKED BY: DATE: 8/15/2011

CSI TASK:

EXCAVATE, LOAD AND HAUL TO DISPOSAL
2-cy Excavator, 3-cy Loader, 16-cy Dump Truck, 20-mile Haul, 25-mph avg.

CREW NAME: *Excavate, Load and Haul Crew* — 8 crew members

2	Eq. Oper. Heavy
1	Oilers
5	Truck Driver, Heavy
1	Hyd. Excavator, 2-cy Bucket
1	Front End Loader, 3-cy Bucket
5	16-cy Dump Trucks

OVERALL PRODUCTION RATE → **92 cy/crew hr**

EXCAVATION

SUB-CREW: Excavation Crew — 1.5 crew members

1	Equip. Oper. Heavy
0.5	Oiler
1	Hydraul. Excavator, 2-cy Bucket

PRODUCTION

2	cy bucket
0.80	% fill
50	min/hr
1.15	cycle/min

→ 92 cy/crew hr

LOADING

SUB-CREW: Loading Crew — 1.5 crew members

1	Equip. Oper. Heavy
0.5	Oiler
1	Front End Loader, 3-cy Bucket

PRODUCTION

3	cy bucket
0.90	% fill
50	min/hr
1.15	cycle/min
15%	swell factor

135 cy/crew hr → 135 cy/crew hr

0.68 crews/equipment members to match overall production rate

1.00 total number of crews needed

TITLE:	Berryessa Creek Flood Control		
SUBJECT:	Output Rates for Excavate, Load and Haul to Disposal Site		
MADE BY:	SKV	JOB NO.:	T26465
CHECKED BY:		DATE:	8/15/2011

HAUL TO DISPOSAL SITE

SUB-CREW: Truck Haul Crew — 1 crew members

1 Truck Driver, Heavy
1 16-cy Dump Truck

PRODUCTION

16	cy truck
0.90	% fill
7.1	min. for loading
5	mi. to disposal location
30	mph haul speed
3.6	min. dump time
50	min/hr
15%	swell factor

QUANTITY PER TRUCK 12.2 cy/truck

DURATION OF HAULING 0.61 hr

20.0 cy/hr →

5.00 Number of truck crews in order to have little to no back up on route

TITLE: Berryessa Creek Flood Control
SUBJECT: Output Rates for Excavate, Load and Haul to Disposal Site
MADE BY: SKV JOB NO.: T26465
CHECKED BY: DATE: 8/15/2011

Sheet No. 1 of 2

CSI TASK:

EXCAVATE COFFERDAM, LOAD AND HAUL DOWNSTREAM
2-cy Excavator, 3-cy Loader, 16-cy Dump Truck, 6000-foot Haul, 10-mph avg.

CREW NAME: *Excavate Cofferdam, Load and Haul Crew* — 6 crew members

- 2 Eq. Oper. Heavy
- 1 Oilers
- 3 Truck Driver, Heavy
- 1 Hyd. Excavator, 2-cy Bucket
- 1 Front End Loader, 3-cy Bucket
- 3 16-cy Dump Trucks

OVERALL PRODUCTION RATE → **92 cy/crew hr**

EXCAVATION

SUB-CREW: Excavation Crew — 1.5 crew members

- 1 Equip. Oper. Heavy
- 0.5 Oiler
- 1 Hydraul. Excavator, 2-cy Bucket

PRODUCTION

2	cy bucket
0.80	% fill
50	min/hr
1.15	cycle/min

→ 92 cy/crew hr

LOADING

SUB-CREW: Loading Crew — 1.5 crew members

- 1 Equip. Oper. Heavy
- 0.5 Oiler
- 1 Front End Loader, 3-cy Bucket

PRODUCTION

3	cy bucket
0.90	% fill
50	min/hr
1.15	cycle/min
15%	swell factor

135 cy/crew hr → 135 cy/crew hr

0.68 crews/equipment members to match overall production rate

1.00 total number of crews needed

TITLE: Berryessa Creek Flood Control
SUBJECT: Output Rates for Excavate, Load and Haul to Disposal Site
MADE BY: SKV JOB NO.: T26465
CHECKED BY: DATE: 8/15/2011

Sheet No. 2 of 2

HAUL TO DISPOSAL SITE

SUB-CREW: Truck Haul Crew — 1 crew members

1 Truck Driver, Heavy
1 16-cy Dump Truck

PRODUCTION

16	cy truck
0.90	% fill
7.1	min. for loading
1.14	mi. to disposal location
10	mph haul speed
3.6	min. dump time
50	min/hr
15%	swell factor

QUANTITY PER TRUCK 12.2 cy/truck

DURATION OF HAULING 0.49 hr

25.2 cy/hr →

3.00 Number of truck crews in order to have little to no back up on route

TITLE:	Berryessa Creek Flood Control		
SUBJECT:	Output Rates for Hand Excavation, Load and Haul to Disposal Site		
MADE BY:	SKV	JOB NO.:	T26465
CHECKED BY:		DATE:	8/15/2011

CSI TASK:

EXCAVATE COFFERDAM, LOAD AND HAUL DOWNSTREAM
2-cy Excavator, 3-cy Loader, 16-cy Dump Truck, 6000-foot Haul, 10-mph avg.

CREW NAME: *Excavate Cofferdam, Load and Haul Crew* — 10 crew members

1	Eq. Oper. Heavy
1	Oilers
4	Laborers
1	Labor Foreman
3	Truck Driver, Heavy
1	Front End Loader, 3-cy Bucket
3	16-cy Dump Trucks

OVERALL PRODUCTION RATE → **8 cy/crew hr**

EXCAVATION

SUB-CREW: Hand Excavation — 5 crew members

4	Laborers
1	Labor Foreman

PRODUCTION

7.5 min/cy

→ 8.0 cy/crew hr

LOADING

SUB-CREW: Loading Crew — 2.0 crew members

1	Equip. Oper. Heavy
1	Oiler
1	Front End Loader, 3-cy Bucket

PRODUCTION

3	cy bucket
0.90	% fill
50	min/hr
1.15	cycle/min
15%	swell factor

135 cy/crew hr → 135 cy/crew hr

0.06 crews/equipment members to match overall production rate

1.00 total number of crews needed

TITLE:	Berryessa Creek Flood Control		
SUBJECT:	Output Rates for Hand Excavation, Load and Haul to Disposal Site		
MADE BY:	SKV	JOB NO.:	T26465
CHECKED BY:		DATE:	8/15/2011

HAUL TO DISPOSAL SITE

SUB-CREW: Truck Haul Crew — 1 crew members

1 Truck Driver, Heavy
1 16-cy Dump Truck

PRODUCTION

16	cy truck
0.90	% fill
7.1	min. for loading
1.14	mi. to disposal location
10	mph haul speed
3.6	min. dump time
50	min/hr
15%	swell factor

QUANTITY PER TRUCK 12.2 cy/truck

DURATION OF HAULING 0.49 hr

25.2 cy/hr →

3.00 Number of truck crews in order to have little to no back up on route

CSI TASK:

EXCAVATE, BACKFILL AND COMPACT
2-cy Excavator, 3-cy Loader, Dozer, Vibratory Roller, 3000-Gallon Water Truck

CREW NAME: *Excavate, Load and Haul Crew* — 5 crew members

1 Eq. Oper. Heavy
1 Oilers
3 Eq. Oper. Med.
2 Laborer
1 Truck Driver, Heavy
1 Hydraul. Excavator, 2-cy Bucket
1 Front End Loader, 3-cy Bucket
1 Dozer
1 Vibratory Roller, Double Drum
1 Water Truck, 3000-Gallons

OVERALL PRODUCTION RATE → **84 cy/crew hr**

EXCAVATION

SUB-CREW: Excavation Crew — 2.0 crew members

1 Equip. Oper. Heavy
1 Oiler
1 Hydraul. Excavator, 2-cy Bucket

PRODUCTION

2	cy bucket
0.80	% fill
50	min/hr
1.05	cycle/min

→ 84 cy/crew hr

FILL FROM STOCKPILE

SUB-CREW: Fill From Stockpile Crew — 3 crew members

2 Eq. Oper. Med.
1 Laborer
1 Front End Loader, 3-cy Bucket
1 Dozer

PRODUCTION

3	cy bucket
0.80	% fill
50	min/hr
0.70	cycle/min

→ 84 cy/crew hr

1.00 crews/equipment members to match overall production rate

1.00 total number of crews needed

COMPACT FILL

SUB-CREW: Compaction Crew 1.5 crew members
1 Laborer
1 Equip. Oper. Medium
1 Vibratory Roller, Double Drum

PRODUCTION 0.24 min/cy 250 cy/hr

0.34 crews/equipment members to match overall production rate

1.00 total number of crews needed

WATER TRUCK

SUB-CREW: Water Truck Crew 1 crew members
1 Truck Driver, Heavy
1 Water Truck, 3000-gal

PRODUCTION 0.25 min/cy 240 cy/hr

0.35 crews/equipment members to match overall production rate

1.00 total number of crews needed

TITLE:	Berryessa Creek Flood Control		
SUBJECT:	Output Rates for Structural Excavation		
MADE BY:	SKV	JOB NO.:	T26465
CHECKED BY:		DATE:	8/15/2011

Sheet No. 1 of 2

CSI TASK:

STRUCTURAL EXCAVATION
2-cy Excavator, Dozer, Push to Stockpile

CREW NAME: *Structural Excavation Crew* — 3 crew members

2	Eq. Oper. Heavy
1	Oilers
1	Hydraul. Excavator, 2-cy Bucket
1	Dozer

PRODUCTION

2	cy bucket
0.80	% fill
50	min/hr
0.37	cycle/min

OVERALL PRODUCTION RATE → **30 cy/crew hr**

TITLE:	Berryessa Creek Flood Control		
SUBJECT:	Output Rates for Excavation and Stockpile		
MADE BY:	SKV	JOB NO.:	T26465
CHECKED BY:		DATE:	8/15/2011

Sheet No. 1 of 2

CSI TASK:

EXCAVATE TO STOCKPILE
2-cy Excavator, Dozer, Push to Stockpile

CREW NAME: *Structural Excavation Crew* — 3 crew members

2	Eq. Oper. Heavy
1	Oilers
1	Hydraul. Excavator, 2-cy Bucket
1	Dozer

PRODUCTION

2	cy bucket
0.85	% fill
50	min/hr
1.10	cycle/min

OVERALL PRODUCTION RATE → **94 cy/crew hr**

TITLE:	Berryessa Creek Flood Control		
SUBJECT:	Output Rates for Hauling Sand to Project Site		
MADE BY:	SKV	JOB NO.:	T26465
CHECKED BY:		DATE:	8/15/2011

CSI TASK:

SAND HAUL TO PROJECT SITE
16-cy Dump Truck, 10-mile Haul, 30-mph Avg.

CREW:

	Truck Haul Crew	1 crew members
2.00	Truck Driver, Heavy	
2.00	16-cy Dump Truck	

PRODUCTION

16	cy truck
0.90	% fill
15.0	min. for loading
10	mi. to disposal location
30	mph haul speed
7.5	min. dump time

Quantity per Truck 14.4 cy/truck

Duration of Round Trip 1.04 hr

13.8 cy/hr →

2.00 Number of truck crews in order to have little to no back up on route

TITLE: Berryessa Creek Flood Control
SUBJECT: Output Rates for Geotextile Materials
MADE BY: SKV
CHECKED BY:
JOB NO.: T26465
DATE: 8/15/2011

Sheet No. 1 of 1

GEOTEXTILE FABRIC

CREW:

Geotextile Fabric Crew — 6 crew members
1 Equip. Oper. Heavy
5 Laborers
1 Crane, 25-ton w/ 80-ft Boom

0.55 min/sy

OVERALL PRODUCTION RATE → **109 sy/hr**

CELLULAR CONFINEMENT SYSTEM

CREW:

Geotextile Fabric Crew — 6 crew members
1 Equip. Oper. Heavy
5 Laborers
1 Crane, 25-ton w/ 80-ft Boom

0.15 min/sf

OVERALL PRODUCTION RATE → **400 sf/hr**

TITLE: Berryessa Creek Flood Control
SUBJECT: Output Rates for Steel Items
MADE BY: SKV
CHECKED BY:
JOB NO.: T26465
DATE: 8/15/2011

Sheet No. 1 of 1

SHEET PILES, DRIVEN

CREW:

Pile Driving Crew — 8 crew members

4 Pile Drivers
2 Equip. Oper. Heavy
1 Oiler
1 Pile Driver Foreman
1 Crane
2 Pile Hammer, Leads
1 Pile Hammer Diesel Engine

1.00 min/vlf

OVERALL PRODUCTION RATE → **60 vlf/hr**

SHEET PILES, DRIVEN

CREW:

Pile Driving Crew — 3 crew members

3 Rodment
1 Truck

0.14 min/lb per person
3.00 Crew Members

OVERALL PRODUCTION RATE → **425 lbs/hr**

APPENDIX F

Phone Logs and Emails

TETRA TECH, INC.

PHONE LOG

CLIENT:	USACE, Sacramento District
JOB TITLE:	Berryessa Creek Flood Control
PROJECT NO.:	T26465
SUBJECT:	Rock Prices
CONVERSATION DATE:	December 30, 2011
PREPARED BY:	Scott Vose
CONVERSATIONALISTS:	Syar Rock Quarry Representative and Scott Vose of Tetra Tech

This phone log summarizes the items discussed or issues resolved during the phone conversation to the best of the writer's ability.

Syar Rock Quarry was contacted and a representative was able to provide the following information. The phone number for Syar Rock Quarry is (707) 643-3261:

- The average cost for their riprap product is $28.85 per ton.
- Their riprap meets USACE quality.
- Aggregate Base Course costs $15.90 per ton.
- The quarry does not own any trucks but they mentioned trucks are costing approximately $92.00 per hour for deliveries.
- Below are calculations to develop a unit cost for delivery:
    - Total quantity of riprap needed = 24,675-tons = 16,450-cy
    - Estimated truck size = 12-cy
    - Estimated haul duration = 60-miles / 35-mph = 1.7-hrs one way = 3.4-hrs round trip
    - Estimated loading time = 10-min, estimated dump time = 5-min
    - 16,450-cy x (1-truck/12-cy) x (3.4-hrs/1-truck) x ($92/1-hr) = $26.07/cy
    - Assume 1.5-tons/cy = $26.07/cy ÷ 1.5-ton/cy = $17.38/ton for delivery of rock.

TETRA TECH, INC.

PHONE LOG

CLIENT:	USACE, Sacramento District
JOB TITLE:	Berryessa Creek Flood Control
PROJECT NO.:	T26465
SUBJECT:	Cellular Confinement System
CONVERSATION DATE:	December 30, 2011
PREPARED BY:	Scott Vose
CONVERSATIONALISTS:	Reed & Graham Inc. and Scott Vose of Tetra Tech

This phone log summarizes the items discussed or issues resolved during the phone conversation to the best of the writer's ability.

Reed & Graham Inc. was contacted and a representative was able to provide the following information. The phone number for Reed & Graham is (888) 381-0800:

- The cost per roll for an average cellular confinement system is approximately $984.00.
- Each roll is 13-ft wide by 246-ft long, for a total area of 359-sy.
- Unit cost = $984.00 / 359-sy = $2.74/sy = $0.31/sf

GEI

Granite Environmental, Inc.
PO Box 780928 Sebastian, FL 32978
Phone: 772-646-0597 Fax:

Quote

Date	QUOTE #
1/2/2012	10569

Name / Address	Ship To
Tetra Tech Customer Phone 760-751-8987 Customer Fax	

Environmental Compliance Product Solutions ~ Metal Storage Cabinets ~ Industrial Supply Products ~ Site Supplies

Terms	REP
To be Established	JMR

Item	Description	Qty	Cost	Total
WOVENSTABILFAB	Woven Stabilization Fabric 12.5' x 360'. 315 LB Tensile	67	375.70	25,171.90T

All credit card payments will incur a 3.5% total balance fee. For your convenience we also accept check by phone at no charge. All shipments destined for Florida will be required to pay sales tax based on that destination county.

Terms for Approved client accounts
VISA, Master Card, American Express and Discover Accepted
Shipping Terms: Ex-works, unless otherwise specified.
Granite Environmental, Inc. Terms & Conditions apply.
NOTE: Dimensions and color will vary and are selected based on production efficiencies. Should a specific color or size be required it must be requested prior to order and confirmed upon invoice.
Prices are valid for 30 days unless otherwise noted. Freight is not included unless otherwise specified.
NO WARRANTY PROVIDED WITHOUT AN APPROVED MSDS

Subtotal	$25,171.90
Sales Tax (0.0%)	$0.00
Total	$25,171.90

The Right Products, Service and peace of mind.

www.GraniteEnvironmental.com

Ask me about our Low Price Guarantee! We will meet or beat a lower price for the same item. Send us a copy of the quote with your order and we will beat it by up to 5%. Same Quality, Better Service! We want your business! ****Subject to Management Approval****

APPENDIX G

Abbreviated Cost and Schedule Risk Analysis

Abbreviated Risk Analysis

Project (less than $40M): **BERRYESSA CREEK FLOOD CONTROL PROJECT**
Project Development Stage: 35% Estimate Level

Total Construction Contract Cost = **$ 10,387,684**

	WBS	Potential Risk Areas	Contract Cost		% Contingency	$ Contingency	Total
1	02 RELOCATIONS	**Relocations**	**$ 1,390,910**		22.92%	$ 318,750	$ 1,709,661
2	09 CHANNELS AND CANALS (Except Navigation Ports and Harbors)	**Mob / Demob / Clearing**	**$ 673,758**		12.50%	$ 84,220	$ 757,977
3	09 CHANNELS AND CANALS (Except Navigation Ports and Harbors)	**Dewatering**	**$ 1,001,818**		25.00%	$ 250,455	$ 1,252,273
4	09 CHANNELS AND CANALS (Except Navigation Ports and Harbors)	**Erosion Control / Construction Access**	**$ 426,480**		10.42%	$ 44,425	$ 470,905
5	09 CHANNELS AND CANALS (Except Navigation Ports and Harbors)	**Riprap**	**$ 2,208,181**		25.00%	$ 552,045	$ 2,760,227
6	09 CHANNELS AND CANALS (Except Navigation Ports and Harbors)	**Railroads**	**$ 588,252**		39.58%	$ 232,850	$ 821,102
7	09 CHANNELS AND CANALS (Except Navigation Ports and Harbors)	**CIP Concrete**	**$ 1,707,502**		31.25%	$ 533,594	$ 2,241,096
8	09 CHANNELS AND CANALS (Except Navigation Ports and Harbors)	**Geotextiles / Cellular Confinement**	**$ 492,809**		12.50%	$ 61,601	$ 554,410
9	14 RECREATION FACILITIES	**Asphalt Access Road**	**$ 789,534**		20.83%	$ 164,486	$ 954,021
10	09 CHANNELS AND CANALS (Except Navigation Ports and Harbors)	**Vegetation**	**$ 43,312**		8.33%	$ 3,609	$ 46,922
11	09 CHANNELS AND CANALS (Except Navigation Ports and Harbors)	**Earthwork**	**$ 735,306**		29.17%	$ 214,464	$ 949,770
12		**Remaining Construction Items**	**$ 329,821**	*3.3%*	2.08%	$ 6,871	$ 336,692
13	30 PLANNING, ENGINEERING, AND DESIGN	**Planning, Engineering, & Design**	**$ 1,440,000**		8.33%	$ 120,000	$ 1,560,000
14	31 CONSTRUCTION MANAGEMENT	**Construction Management**	**$ 960,000**		6.25%	$ 60,000	$ 1,020,000

Totals					
Total Construction Estimate	$ 10,387,684		23.75%	$ 2,467,371	$ 12,855,055
Total Planning, Engineering & Design	$ 1,440,000		8.33%	$ 120,000	$ 1,560,000
Total Construction Management	$ 960,000		6.25%	$ 60,000	$ 1,020,000
Total	$ 12,787,684			$ 2,647,371	$ 15,435,055

APPENDIX H

MCACES Construction Cost Estimates

Estimated by	Tetra Tech, Inc.
Designed by	Tetra Tech, Inc.
Prepared by	Tetra Tech, Inc
Preparation Date	5/29/2013
Effective Date of Pricing	3/28/2013
Estimated Construction Time	704 Days

Description	Quantity	UOM	ContractCost	Escalation	Contingency	SIOH	MiscOwner	ProjectCost	C/O
Project Cost Summary Report			**10,228,092**	**0**	**0**	**0**	**0**	**10,228,092**	
Berryessa Creek Flood Control	**1.00**	**LS**	**10,228,092**	**0**	**0**	**0**	**0**	**10,228,092**	
02 Relocations	**1.00**	**LS**	**1,390,910**	**0**	**0**	**0**	**0**	**1,390,910**	
02 02 Reach 2	**1.00**	**LS**	**60,762**	**0**	**0**	**0**	**0**	**60,762**	
			179.13					*179.13*	
02 02 01 12kv Underground Line - STA 233+00	**75.00**	**LF**	**13,435**	**0**	**0**	**0**	**0**	**13,435**	
			80.37					*80.37*	
02 02 01 01 Demolition	**75.00**	**LF**	**6,027**	**0**	**0**	**0**	**0**	**6,027**	
			98.76					*98.76*	
02 02 01 02 Relocation	**75.00**	**LF**	**7,407**	**0**	**0**	**0**	**0**	**7,407**	
			130.15					*130.15*	
02 02 03 350A Underground Line - STA 222+00	**140.00**	**LF**	**18,221**	**0**	**0**	**0**	**0**	**18,221**	
			49.26					*49.26*	
02 02 01 01 Demolition	**140.00**	**LF**	**6,897**	**0**	**0**	**0**	**0**	**6,897**	
			80.89					*80.89*	
02 02 01 02 Relocation	**140.00**	**LF**	**11,324**	**0**	**0**	**0**	**0**	**11,324**	
			103.95					*103.95*	
02 02 04 12kv Underground Line - STA 211+80	**280.00**	**LF**	**29,106**	**0**	**0**	**0**	**0**	**29,106**	
			31.30					*31.30*	
02 02 01 01 Demolition	**280.00**	**LF**	**8,763**	**0**	**0**	**0**	**0**	**8,763**	
			72.66					*72.66*	
02 02 01 02 Relocation	**280.00**	**LF**	**20,343**	**0**	**0**	**0**	**0**	**20,343**	
02 04 Reach 4	**1.00**	**LS**	**11,578**	**0**	**0**	**0**	**0**	**11,578**	
			210.51					*210.51*	
02 04 01 12kv Underground Line - STA 208+40	**55.00**	**LF**	**11,578**	**0**	**0**	**0**	**0**	**11,578**	
			104.66					*104.66*	
02 02 01 01 Demolition	**55.00**	**LF**	**5,756**	**0**	**0**	**0**	**0**	**5,756**	
			105.85					*105.85*	
02 02 01 02 Relocation	**55.00**	**LF**	**5,822**	**0**	**0**	**0**	**0**	**5,822**	
02 06 Reach 6	**1.00**	**LS**	**25,296**	**0**	**0**	**0**	**0**	**25,296**	
			175.33					*175.33*	
02 06 01 12kv Underground Line - STA 205+80	**75.00**	**LF**	**13,150**	**0**	**0**	**0**	**0**	**13,150**	
			80.37					*80.37*	
02 02 01 01 Demolition	**75.00**	**LF**	**6,027**	**0**	**0**	**0**	**0**	**6,027**	
			94.97					*94.97*	

Labor ID: 01SC2013 EQ ID: EP11R07 Currency in US dollars TRACES MII Version 4.2

Description	Quantity	UOM	ContractCost	Escalation	Contingency	SIOH	MiscOwner	ProjectCost	C/O
02 02 01 02 Relocation	**75.00**	**LF**	**7,123**	**0**	**0**	**0**	**0**	**7,123**	
			202.44					*202.44*	
02 06 02 12kv Underground Line - STA 197+60	**60.00**	**LF**	**12,146**	**0**	**0**	**0**	**0**	**12,146**	
			96.87					*96.87*	
02 02 01 01 Demolition	**60.00**	**LF**	**5,812**	**0**	**0**	**0**	**0**	**5,812**	
			105.56					*105.56*	
02 02 01 02 Relocation	**60.00**	**LF**	**6,334**	**0**	**0**	**0**	**0**	**6,334**	
02 08 Reach 8	**1.00**	**LS**	**22,775**	**0**	**0**	**0**	**0**	**22,775**	
			303.66					*303.66*	
02 08 01 12" Waterlines - STA 183+00	**75.00**	**LF**	**22,775**	**0**	**0**	**0**	**0**	**22,775**	
			102.01					*102.01*	
02 08 01 01 Demolition	**75.00**	**LF**	**7,651**	**0**	**0**	**0**	**0**	**7,651**	
			201.65					*201.65*	
02 08 01 02 Relocation	**75.00**	**LF**	**15,124**	**0**	**0**	**0**	**0**	**15,124**	
02 10 Reach 10	**1.00**	**LS**	**22,854**	**0**	**0**	**0**	**0**	**22,854**	
			380.90					*380.90*	
3-1/0A XLCJ 21kv Underground - STA 181+20 to 181+80	**60.00**	**LF**	**22,854**	**0**	**0**	**0**	**0**	**22,854**	
			175.29					*175.29*	
02 12 03 01 Demolition	**60.00**	**LF**	**10,517**	**0**	**0**	**0**	**0**	**10,517**	
			205.61					*205.61*	
02 12 03 02 Relocation	**60.00**	**LF**	**12,337**	**0**	**0**	**0**	**0**	**12,337**	
02 12 Reach 12	**1.00**	**LS**	**245,676**	**0**	**0**	**0**	**0**	**245,676**	
			159.90					*159.90*	
02 12 01 Telephone Conduit - STA 160+00	**200.00**	**LF**	**31,980**	**0**	**0**	**0**	**0**	**31,980**	
			28.64					*28.64*	
02 02 01 01 Demolition	**200.00**	**LF**	**5,728**	**0**	**0**	**0**	**0**	**5,728**	
			131.26					*131.26*	
02 02 01 02 Relocation	**200.00**	**LF**	**26,253**	**0**	**0**	**0**	**0**	**26,253**	
			650.72					*650.72*	
02 12 02 27" CMP - STA 154+00	**35.00**	**LF**	**22,775**	**0**	**0**	**0**	**0**	**22,775**	
			112.95					*112.95*	
02 12 02 01 Demolition	**35.00**	**LF**	**3,953**	**0**	**0**	**0**	**0**	**3,953**	
			537.76					*537.76*	
02 12 02 02 Relocation	**35.00**	**LF**	**18,822**	**0**	**0**	**0**	**0**	**18,822**	
			208.90					*208.90*	

Labor ID: 01SC2013 EQ ID: EP11R07 Currency in US dollars TRACES MII Version 4.2

Description	Quantity	UOM	ContractCost	Escalation	Contingency	SIOH	MiscOwner	ProjectCost	C/O
02 12 03 8" VCP Sanitary Sewer System - STA 153+80	**75.00**	**LF**	**15,668**	**0**	**0**	**0**	**0**	**15,668**	
			66.74					*66.74*	
02 12 03 01 Demolition	**75.00**	**LF**	**5,005**	**0**	**0**	**0**	**0**	**5,005**	
			142.16					*142.16*	
02 12 03 02 Relocation	**75.00**	**LF**	**10,662**	**0**	**0**	**0**	**0**	**10,662**	
			352.40					*352.40*	
02 12 04 3-1/0A XLCJ 21 kv - STA 151+00	**70.00**	**LF**	**24,668**	**0**	**0**	**0**	**0**	**24,668**	
			152.57					*152.57*	
02 12 04 01 Demolition	**70.00**	**LF**	**10,680**	**0**	**0**	**0**	**0**	**10,680**	
			199.83					*199.83*	
02 12 04 02 Relocation	**70.00**	**LF**	**13,988**	**0**	**0**	**0**	**0**	**13,988**	
			486.10					*486.10*	
02 12 05 3-700A and 1-350A Underground - STA 149+20	**160.00**	**LF**	**77,776**	**0**	**0**	**0**	**0**	**77,776**	
			100.03					*100.03*	
02 12 05 01 Demolition	**160.00**	**LF**	**16,005**	**0**	**0**	**0**	**0**	**16,005**	
			386.07					*386.07*	
02 12 05 02 Relocation	**160.00**	**LF**	**61,771**	**0**	**0**	**0**	**0**	**61,771**	
			237.93					*237.93*	
02 12 06 15" VCP Sanitary Sewer System - STA 142+40	**75.00**	**LF**	**17,844**	**0**	**0**	**0**	**0**	**17,844**	
			66.84					*66.84*	
02 12 06 01 Demolition	**75.00**	**LF**	**5,013**	**0**	**0**	**0**	**0**	**5,013**	
			171.08					*171.08*	
02 12 06 02 Relocation	**75.00**	**LF**	**12,831**	**0**	**0**	**0**	**0**	**12,831**	
			99.94					*99.94*	
02 12 07 12kv Underground Line - STA 138+60	**550.00**	**LF**	**54,964**	**0**	**0**	**0**	**0**	**54,964**	
			22.51					*22.51*	
02 12 07 01 Demolition	**550.00**	**LF**	**12,383**	**0**	**0**	**0**	**0**	**12,383**	
			77.42					*77.42*	
02 12 07 02 Relocation	**550.00**	**LF**	**42,581**	**0**	**0**	**0**	**0**	**42,581**	
02 14 Reach 14	**1.00**	**LS**	**1,001,970**	**0**	**0**	**0**	**0**	**1,001,970**	
			160.18					*160.18*	
02 14 01 Underground 3-350A XLCJ 12kv - STA 132+00 to 138+00	**550.00**	**LF**	**88,096**	**0**	**0**	**0**	**0**	**88,096**	
			36.62					*36.62*	
02 14 01 01 Demolition	**550.00**	**LF**	**20,142**	**0**	**0**	**0**	**0**	**20,142**	
			123.55					*123.55*	

Labor ID: 01SC2013 EQ ID: EP11R07 Currency in US dollars TRACES MII Version 4.2

Description	Quantity	UOM	ContractCost	Escalation	Contingency	SIOH	MiscOwner	ProjectCost	C/O
02 14 01 02 Relocation	**550.00**	**LF**	**67,955**	**0**	**0**	**0**	**0**	**67,955**	
			209.04					*209.04*	
02 14 02 8" VCP Sanitary Sewer System - STA 137+20	**75.00**	**LF**	**15,678**	**0**	**0**	**0**	**0**	**15,678**	
			66.84					*66.84*	
02 14 02 01 Demolition	**75.00**	**LF**	**5,013**	**0**	**0**	**0**	**0**	**5,013**	
			142.20					*142.20*	
02 14 02 02 Relocation	**75.00**	**LF**	**10,665**	**0**	**0**	**0**	**0**	**10,665**	
			248.62					*248.62*	
02 14 03 12" CMP Storm Drain Outlet - STA 137+00	**50.00**	**LF**	**12,431**	**0**	**0**	**0**	**0**	**12,431**	
			56.30					*56.30*	
02 14 03 01 Demo Concrete Headwall and Pipe	**50.00**	**LF**	**2,815**	**0**	**0**	**0**	**0**	**2,815**	
			192.31					*192.31*	
02 14 03 02 Replace of Outlet Structure	**50.00**	**LF**	**9,616**	**0**	**0**	**0**	**0**	**9,616**	
			123.16					*123.16*	
02 02 02 02 01 RCP Placement	**50.00**	**LF**	**6,158**	**0**	**0**	**0**	**0**	**6,158**	
			2,381.75					*2,381.75*	
02 02 02 02 02 Concrete Headwall and Footing	**1.40**	**CY**	**3,334**	**0**	**0**	**0**	**0**	**3,334**	
			87.83					*87.83*	
02 02 02 02 03 Riprap	**1.40**	**TON**	**123**	**0**	**0**	**0**	**0**	**123**	
			6,488.87					*6,488.87*	
02 14 05 Sanitary Sewer System Manhole - STA 134+80	**1.00**	**EA**	**6,489**	**0**	**0**	**0**	**0**	**6,489**	
			1,787.29					*1,787.29*	
02 14 05 01 Demolition	**1.00**	**EA**	**1,787**	**0**	**0**	**0**	**0**	**1,787**	
			4,701.59					*4,701.59*	
02 14 05 02 Relocation	**1.00**	**EA**	**4,702**	**0**	**0**	**0**	**0**	**4,702**	
			532.79					*532.79*	
02 14 06 24" CMP - STA 133+50	**45.00**	**LF**	**23,975**	**0**	**0**	**0**	**0**	**23,975**	
			89.28					*89.28*	
02 14 02 01 Demolition	**45.00**	**LF**	**4,018**	**0**	**0**	**0**	**0**	**4,018**	
			443.51					*443.51*	
02 14 02 02 Relocation	**45.00**	**LF**	**19,958**	**0**	**0**	**0**	**0**	**19,958**	
			168.37					*168.37*	
02 12 06 15" VCP Sanitary Sewer System - STA 131+60 to 182+40	**5,080.00**	**LF**	**855,300**	**0**	**0**	**0**	**0**	**855,300**	
			50.63					*50.63*	
02 12 06 01 Demolition	**5,080.00**	**LF**	**257,222**	**0**	**0**	**0**	**0**	**257,222**	

Currency in US dollars

Description	Quantity	UOM	ContractCost	Escalation	Contingency	SIOH	MiscOwner	ProjectCost	C/O
			105.85					*105.85*	
02 12 06 02 Relocation	**5,080.00**	**LF**	**537,736**	**0**	**0**	**0**	**0**	**537,736**	
			6,034.23					*6,034.23*	
New Manholes due to Relocation	**10.00**	**EA**	**60,342**	**0**	**0**	**0**	**0**	**60,342**	
			6,034.23					*6,034.23*	
02 14 05 Sanitary Sewer System Manhole - STA 134+80	**10.00**	**EA**	**60,342**	**0**	**0**	**0**	**0**	**60,342**	
			1,787.29					*1,787.29*	
02 14 05 01 Demolition	**10.00**	**EA**	**17,873**	**0**	**0**	**0**	**0**	**17,873**	
			4,246.94					*4,246.94*	
02 14 05 02 Relocation	**10.00**	**EA**	**42,469**	**0**	**0**	**0**	**0**	**42,469**	
09 Channels	**1.00**	**LS**	**8,728,182**	**0**	**0**	**0**	**0**	**8,728,182**	
09 AA Mobilization / Demobilization	**1.00**	**LS**	**283,199**	**0**	**0**	**0**	**0**	**283,199**	
			187,993.70					*187,993.70*	
09 AA 01 Mobilization	**1.00**	**EA**	**187,994**	**0**	**0**	**0**	**0**	**187,994**	
			95,205.70					*95,205.70*	
09 AA 02 Demobilization	**1.00**	**EA**	**95,206**	**0**	**0**	**0**	**0**	**95,206**	
09 BB Dewatering	**1.00**	**LS**	**989,507**	**0**	**0**	**0**	**0**	**989,507**	
09 BB 01 Dewatering Reaches 1-2	**1.00**	**LS**	**295,915**	**0**	**0**	**0**	**0**	**295,915**	
			8,788.43					*8,788.43*	
09 BB 01 01 Coffer Dams	**2.00**	**EA**	**17,577**	**0**	**0**	**0**	**0**	**17,577**	
			27.38					*27.38*	
09 BB 01 01 01 Cofferdam Installation	**534.00**	**CY**	**14,623**	**0**	**0**	**0**	**0**	**14,623**	
			11.06					*11.06*	
09 BB 01 01 02 Cofferdam Removal	**267.00**	**CY**	**2,953**	**0**	**0**	**0**	**0**	**2,953**	
09 BB 01 02 Dewater Pumping	**1.00**	**LS**	**278,338**	**0**	**0**	**0**	**0**	**278,338**	
09 BB 02 Dewatering Reaches 3-8	**1.00**	**LS**	**259,363**	**0**	**0**	**0**	**0**	**259,363**	
			7,158.26					*7,158.26*	
09 BB 02 01 Coffer Dams	**2.00**	**EA**	**14,317**	**0**	**0**	**0**	**0**	**14,317**	
			42.56					*42.56*	
09 BB 02 01 01 Cofferdam Installation	**267.00**	**CY**	**11,363**	**0**	**0**	**0**	**0**	**11,363**	
			11.06					*11.06*	
09 BB 02 01 02 Cofferdam Removal	**267.00**	**CY**	**2,953**	**0**	**0**	**0**	**0**	**2,953**	
09 BB 02 02 Dewater Pumping	**1.00**	**LS**	**245,046**	**0**	**0**	**0**	**0**	**245,046**	
09 BB 03 Dewatering Reaches 9-10	**1.00**	**LS**	**91,307**	**0**	**0**	**0**	**0**	**91,307**	
			7,424.53					*7,424.53*	

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Description	Quantity	UOM	ContractCost	Escalation	Contingency	SIOH	MiscOwner	ProjectCost	C/O
09 BB 03 01 Coffer Dams	**2.00**	**EA**	**14,849**	**0**	**0**	**0**	**0**	**14,849**	
			44.55					*44.55*	
09 BB 03 01 01 Cofferdam Installation	**267.00**	**CY**	**11,896**	**0**	**0**	**0**	**0**	**11,896**	
			11.06					*11.06*	
09 BB 03 01 02 Cofferdam Removal	**267.00**	**CY**	**2,953**	**0**	**0**	**0**	**0**	**2,953**	
09 BB 03 02 Dewater Pumping	**1.00**	**LS**	**76,458**	**0**	**0**	**0**	**0**	**76,458**	
09 BB 04 Dewatering Reaches 11-12	**1.00**	**LS**	**229,483**	**0**	**0**	**0**	**0**	**229,483**	
			7,158.26					*7,158.26*	
09 BB 04 01 Coffer Dams	**2.00**	**EA**	**14,317**	**0**	**0**	**0**	**0**	**14,317**	
			42.56					*42.56*	
09 BB 04 01 01 Cofferdam Installation	**267.00**	**CY**	**11,363**	**0**	**0**	**0**	**0**	**11,363**	
			11.06					*11.06*	
09 BB 04 01 02 Cofferdam Removal	**267.00**	**CY**	**2,953**	**0**	**0**	**0**	**0**	**2,953**	
09 BB 04 02 Dewater Pumping	**1.00**	**LS**	**215,166**	**0**	**0**	**0**	**0**	**215,166**	
09 BB 05 Dewatering Reaches 13-16	**1.00**	**LS**	**113,440**	**0**	**0**	**0**	**0**	**113,440**	
			9,657.78					*9,657.78*	
09 BB 05 01 Coffer Dams	**2.00**	**EA**	**19,316**	**0**	**0**	**0**	**0**	**19,316**	
			42.56					*42.56*	
09 BB 05 01 01 Cofferdam Installation	**267.00**	**CY**	**11,363**	**0**	**0**	**0**	**0**	**11,363**	
			14.89					*14.89*	
09 BB 05 01 02 Cofferdam Removal	**534.00**	**CY**	**7,952**	**0**	**0**	**0**	**0**	**7,952**	
09 BB 05 02 Dewater Pumping	**1.00**	**LS**	**94,124**	**0**	**0**	**0**	**0**	**94,124**	
			12,331.57					*12,331.57*	
09 CC Clearing and Grubbing	**31.00**	**ACR**	**382,279**	**0**	**0**	**0**	**0**	**382,279**	
			2,318.27					*2,318.27*	
09 CC 01 Clear and Grub	**31.00**	**ACR**	**71,866**	**0**	**0**	**0**	**0**	**71,866**	
			25.03					*25.03*	
09 CC 02 Load and Haul Debris	**12,400.00**	**CY**	**310,412**	**0**	**0**	**0**	**0**	**310,412**	
09 DD Erosion Control	**1.00**	**LS**	**382,643**	**0**	**0**	**0**	**0**	**382,643**	
09 EE Construction Access	**1.00**	**LS**	**38,596**	**0**	**0**	**0**	**0**	**38,596**	
			2,093.75					*2,093.75*	
09 EE 01 Access Ramps	**10.00**	**EA**	**20,937**	**0**	**0**	**0**	**0**	**20,937**	
			1,765.85					*1,765.85*	
09 EE 02 Temporary Access Roads	**10.00**	**EA**	**17,659**	**0**	**0**	**0**	**0**	**17,659**	
09 01 Reach 1	**1.00**	**LS**	**1,117**	**0**	**0**	**0**	**0**	**1,117**	

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Description	Quantity	UOM	ContractCost	Escalation	Contingency	SIOH	MiscOwner	ProjectCost	C/O
			14.89					*14.89*	
09 01 01 Excavate and Haul	**75.00**	**CY**	**1,117**	**0**	**0**	**0**	**0**	**1,117**	
09 02 Reach 2	**1.00**	**LS**	**817,710**	**0**	**0**	**0**	**0**	**817,710**	
			12.22					*12.22*	
09 02 01 Place and Compact Fill	**100.00**	**CY**	**1,222**	**0**	**0**	**0**	**0**	**1,222**	
			14.89					*14.89*	
09 02 02 Excavate and Haul	**4,074.00**	**CY**	**60,671**	**0**	**0**	**0**	**0**	**60,671**	
			88.37					*88.37*	
09 02 03 Import and Place Riprap	**5,750.00**	**TON**	**508,138**	**0**	**0**	**0**	**0**	**508,138**	
			6.32					*6.32*	
09 02 04 Geotextile Fabric	**7,700.00**	**SY**	**48,677**	**0**	**0**	**0**	**0**	**48,677**	
			2.71					*2.71*	
09 02 05 Cellular Confinement System	**20,453.00**	**SF**	**55,365**	**0**	**0**	**0**	**0**	**55,365**	
			1,156.76					*1,156.76*	
09 02 06 CIP Concrete	**90.00**	**CY**	**104,109**	**0**	**0**	**0**	**0**	**104,109**	
			16.30					*16.30*	
09 02 06 01 Earthwork	**235.00**	**CY**	**3,830**	**0**	**0**	**0**	**0**	**3,830**	
			1,114.20					*1,114.20*	
09 02 06 02 Concrete	**90.00**	**CY**	**100,278**	**0**	**0**	**0**	**0**	**100,278**	
			1.74					*1.74*	
09 02 07 Reinforcing Steel	**18,000.00**	**LB**	**31,240**	**0**	**0**	**0**	**0**	**31,240**	
			4,316.91					*4,316.91*	
09 02 08 Planting - Grasses on Banks	**1.92**	**ACR**	**8,288**	**0**	**0**	**0**	**0**	**8,288**	
09 03 Reach 3	**1.00**	**LS**	**2,234**	**0**	**0**	**0**	**0**	**2,234**	
			14.89					*14.89*	
09 03 01 Excavate and Haul	**150.00**	**CY**	**2,234**	**0**	**0**	**0**	**0**	**2,234**	
09 04 Reach 4	**1.00**	**LS**	**134,414**	**0**	**0**	**0**	**0**	**134,414**	
			14.89					*14.89*	
09 04 01 Excavate and Haul	**896.00**	**CY**	**13,344**	**0**	**0**	**0**	**0**	**13,344**	
			88.38					*88.38*	
09 04 02 Import and Place Riprap	**1,000.00**	**TON**	**88,379**	**0**	**0**	**0**	**0**	**88,379**	
			6.32					*6.32*	
09 04 03 Geotextile Fabric	**1,400.00**	**SY**	**8,850**	**0**	**0**	**0**	**0**	**8,850**	
			2.71					*2.71*	
09 04 04 Cellular Confinement System	**8,156.00**	**SF**	**22,072**	**0**	**0**	**0**	**0**	**22,072**	

Labor ID: 01SC2013 EQ ID: EP11R07 Currency in US dollars TRACES MII Version 4.2

Description	Quantity	UOM	ContractCost	Escalation	Contingency	SIOH	MiscOwner	ProjectCost	C/O
			4,315.95					*4,315.95*	
09 04 05 Planting - Grasses on Banks	**0.41**	**ACR**	**1,770**	**0**	**0**	**0**	**0**	**1,770**	
09 05 Reach 5	**1.00**	**LS**	**1,189,923**	**0**	**0**	**0**	**0**	**1,189,923**	
			14.89					*14.89*	
09 05 01 Excavate and Haul	**10.00**	**CY**	**149**	**0**	**0**	**0**	**0**	**149**	
09 05 02 Temporary Shoo-Fly Structure	**1.00**	**LS**	**386,798**	**0**	**0**	**0**	**0**	**386,798**	
			47.60					*47.60*	
09 05 02 01 Embankment	**306.00**	**CY**	**14,565**	**0**	**0**	**0**	**0**	**14,565**	
			1,403.58					*1,403.58*	
09 05 02 02 Railroad Track	**250.00**	**LF**	**350,895**	**0**	**0**	**0**	**0**	**350,895**	
			85.35					*85.35*	
09 05 02 03 Demolition	**250.00**	**LF**	**21,337**	**0**	**0**	**0**	**0**	**21,337**	
			19.95					*19.95*	
09 05 03 Demo, Haul, and Dispose Rails	**120.00**	**LF**	**2,393**	**0**	**0**	**0**	**0**	**2,393**	
			13.93					*13.93*	
09 05 04 Demo, Haul, and Dispose Timber	**10,000.00**	**BF**	**139,255**	**0**	**0**	**0**	**0**	**139,255**	
			16.31					*16.31*	
09 05 05 Excavate, Backfill and Compact	**250.00**	**CY**	**4,078**	**0**	**0**	**0**	**0**	**4,078**	
			1,166.09					*1,166.09*	
09 05 06 Construct Replacement Culvert (Triple Box)	**350.00**	**CY**	**408,133**	**0**	**0**	**0**	**0**	**408,133**	
			1.74					*1.74*	
09 05 07 Reinforcing Steel	**70,000.00**	**LB**	**121,489**	**0**	**0**	**0**	**0**	**121,489**	
			11,256.17					*11,256.17*	
09 05 08 Construct Wingwalls & Headwalls w/ Rails	**6.00**	**EA**	**67,537**	**0**	**0**	**0**	**0**	**67,537**	
			771.62					*771.62*	
09 05 08 01 Cast-in-Place Concrete	**53.00**	**CY**	**40,896**	**0**	**0**	**0**	**0**	**40,896**	
			1.74					*1.74*	
09 05 08 02 Reinforcing Steel	**10,600.00**	**LB**	**18,397**	**0**	**0**	**0**	**0**	**18,397**	
			68.70					*68.70*	
09 05 08 03 Railing	**120.00**	**LF**	**8,244**	**0**	**0**	**0**	**0**	**8,244**	
			438.14					*438.14*	
09 05 09 Reconstruct Rails and Ties	**120.00**	**LF**	**52,577**	**0**	**0**	**0**	**0**	**52,577**	
			94.44					*94.44*	
09 05 10 Import and Place Riprap	**75.00**	**TON**	**7,083**	**0**	**0**	**0**	**0**	**7,083**	
			4,316.82					*4,316.82*	

Labor ID: 01SC2013 EQ ID: EP11R07 Currency in US dollars TRACES MII Version 4.2

Description	Quantity	UOM	ContractCost	Escalation	Contingency	SIOH	MiscOwner	ProjectCost	C/O
09 05 11 Planting - Grasses on Banks	**0.10**	**ACR**	**432**	**0**	**0**	**0**	**0**	**432**	
09 06 Reach 6	**1.00**	**LS**	**589,126**	**0**	**0**	**0**	**0**	**589,126**	
			14.89					*14.89*	
09 06 01 Excavate and Haul	**4,257.00**	**CY**	**63,397**	**0**	**0**	**0**	**0**	**63,397**	
			88.37					*88.37*	
09 06 02 Import and Place Riprap	**4,750.00**	**TON**	**419,760**	**0**	**0**	**0**	**0**	**419,760**	
			6.32					*6.32*	
09 06 03 Geotextile Fabric	**6,650.00**	**SY**	**42,036**	**0**	**0**	**0**	**0**	**42,036**	
			2.71					*2.71*	
09 06 04 Cellular Confinement System	**20,351.00**	**SF**	**55,085**	**0**	**0**	**0**	**0**	**55,085**	
			4,316.82					*4,316.82*	
09 02 05 Planting - Grasses on Banks	**2.05**	**ACR**	**8,849**	**0**	**0**	**0**	**0**	**8,849**	
09 07 Reach 7	**1.00**	**LS**	**2,740**	**0**	**0**	**0**	**0**	**2,740**	
			45.67					*45.67*	
09 07 01 Excavate and Haul	**60.00**	**CY**	**2,740**	**0**	**0**	**0**	**0**	**2,740**	
09 08 Reach 8	**1.00**	**LS**	**126,264**	**0**	**0**	**0**	**0**	**126,264**	
			14.89					*14.89*	
09 08 01 Excavate and Haul	**1,222.00**	**CY**	**18,198**	**0**	**0**	**0**	**0**	**18,198**	
			88.38					*88.38*	
09 08 02 Import and Place Riprap	**1,000.00**	**TON**	**88,379**	**0**	**0**	**0**	**0**	**88,379**	
			6.32					*6.32*	
09 08 03 Geotextile Fabric	**1,400.00**	**SY**	**8,850**	**0**	**0**	**0**	**0**	**8,850**	
			2.70					*2.70*	
09 08 04 Cellular Confinement System	**3,419.00**	**SF**	**9,239**	**0**	**0**	**0**	**0**	**9,239**	
			4,317.30					*4,317.30*	
09 08 05 Planting - Grasses on Banks	**0.37**	**ACR**	**1,597**	**0**	**0**	**0**	**0**	**1,597**	
09 09 Reach 9	**1.00**	**LS**	**101,703**	**0**	**0**	**0**	**0**	**101,703**	
			14.89					*14.89*	
09 09 01 Excavate and Haul	**200.00**	**CY**	**2,978**	**0**	**0**	**0**	**0**	**2,978**	
			16.31					*16.31*	
09 09 02 Excavate, Backfill and Compact	**100.00**	**CY**	**1,631**	**0**	**0**	**0**	**0**	**1,631**	
			77.26					*77.26*	
09 09 03 Sheet Piling	**1,200.00**	**SF**	**92,712**	**0**	**0**	**0**	**0**	**92,712**	
			87.61					*87.61*	
09 09 04 Import and Place Riprap	**50.00**	**TON**	**4,381**	**0**	**0**	**0**	**0**	**4,381**	

Currency in US dollars

Description	Quantity	UOM	ContractCost	Escalation	Contingency	SIOH	MiscOwner	ProjectCost	C/O
09 10 Reach 10	**1.00**	**LS**	**351,281**	**0**	**0**	**0**	**0**	**351,281**	
			14.89					*14.89*	
09 10 01 Excavate and Haul	**2,600.00**	**CY**	**38,720**	**0**	**0**	**0**	**0**	**38,720**	
			88.38					*88.38*	
09 10 02 Import and Place Riprap	**3,000.00**	**TON**	**265,136**	**0**	**0**	**0**	**0**	**265,136**	
			6.32					*6.32*	
09 10 03 Geotextile Fabric	**4,200.00**	**SY**	**26,551**	**0**	**0**	**0**	**0**	**26,551**	
			2.70					*2.70*	
09 10 04 Cellular Confinement System	**5,967.00**	**SF**	**16,126**	**0**	**0**	**0**	**0**	**16,126**	
			4,316.82					*4,316.82*	
09 10 05 Planting - Grasses on Banks	**1.10**	**ACR**	**4,748**	**0**	**0**	**0**	**0**	**4,748**	
09 11 Reach 11	**1.00**	**LS**	**84,016**	**0**	**0**	**0**	**0**	**84,016**	
			14.89					*14.89*	
09 11 01 Excavate and Haul	**200.00**	**CY**	**2,978**	**0**	**0**	**0**	**0**	**2,978**	
			16.31					*16.31*	
09 11 02 Excavate, Backfill and Compact	**100.00**	**CY**	**1,631**	**0**	**0**	**0**	**0**	**1,631**	
			62.52					*62.52*	
09 11 03 Sheet Piling	**1,200.00**	**SF**	**75,022**	**0**	**0**	**0**	**0**	**75,022**	
			87.69					*87.69*	
09 11 04 Import and Place Riprap	**50.00**	**TON**	**4,384**	**0**	**0**	**0**	**0**	**4,384**	
09 12 Reach 12	**1.00**	**LS**	**2,526,149**	**0**	**0**	**0**	**0**	**2,526,149**	
			12.22					*12.22*	
09 12 01 Place and Compact Fill (Piedmont Creek Confluence)	**75.00**	**CY**	**916**	**0**	**0**	**0**	**0**	**916**	
			14.89					*14.89*	
09 12 02 Excavate and Haul	**24,278.00**	**CY**	**361,555**	**0**	**0**	**0**	**0**	**361,555**	
			16.31					*16.31*	
09 12 03 Excavate and Regrade Onsite	**25.00**	**CY**	**408**	**0**	**0**	**0**	**0**	**408**	
			88.38					*88.38*	
09 12 04 Import and Place Riprap	**7,750.00**	**TON**	**684,934**	**0**	**0**	**0**	**0**	**684,934**	
			6.32					*6.32*	
09 12 05 Geotextile Fabric	**10,500.00**	**SY**	**66,377**	**0**	**0**	**0**	**0**	**66,377**	
			2.71					*2.71*	
09 12 06 Cellular Confinement System	**34,227.00**	**SF**	**92,639**	**0**	**0**	**0**	**0**	**92,639**	
			117.24					*117.24*	
09 12 07 Roadway Base	**3,000.00**	**CY**	**351,713**	**0**	**0**	**0**	**0**	**351,713**	

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Description	Quantity	UOM	ContractCost	Escalation	Contingency	SIOH	MiscOwner	ProjectCost	C/O
			5.87					*5.87*	
09 12 08 Access Road Surface	**54,000.00**	**SF**	**316,741**	**0**	**0**	**0**	**0**	**316,741**	
			1,098.38					*1,098.38*	
09 12 09 Cast-in-Place Concrete	**440.00**	**CY**	**483,287**	**0**	**0**	**0**	**0**	**483,287**	
			16.33					*16.33*	
09 02 12 01 Earthwork	**1,203.00**	**CY**	**19,642**	**0**	**0**	**0**	**0**	**19,642**	
			1,053.74					*1,053.74*	
09 02 12 02 Concrete	**440.00**	**CY**	**463,645**	**0**	**0**	**0**	**0**	**463,645**	
			1.74					*1.74*	
09 12 10 Reinforcing Steel	**88,000.00**	**LB**	**152,729**	**0**	**0**	**0**	**0**	**152,729**	
			4,316.92					*4,316.92*	
09 12 11 Planting - Grasses on Banks	**3.44**	**ACR**	**14,850**	**0**	**0**	**0**	**0**	**14,850**	
09 13 Reach 13	**1.00**	**LS**	**10,600**	**0**	**0**	**0**	**0**	**10,600**	
			141.33					*141.33*	
09 13 01 Excavate and Haul	**75.00**	**CY**	**10,600**	**0**	**0**	**0**	**0**	**10,600**	
09 14 Reach 14	**1.00**	**LS**	**679,155**	**0**	**0**	**0**	**0**	**679,155**	
			14.89					*14.89*	
09 14 01 Excavate and Haul	**6,861.00**	**CY**	**102,176**	**0**	**0**	**0**	**0**	**102,176**	
			88.38					*88.38*	
09 14 02 Import and Place Riprap	**1,250.00**	**TON**	**110,473**	**0**	**0**	**0**	**0**	**110,473**	
			6.32					*6.32*	
09 14 03 Geotextile Fabric	**1,750.00**	**SY**	**11,063**	**0**	**0**	**0**	**0**	**11,063**	
			2.71					*2.71*	
09 14 04 Cellular Confinement System	**8,803.00**	**SF**	**23,824**	**0**	**0**	**0**	**0**	**23,824**	
			117.18					*117.18*	
09 14 05 Roadway Base	**500.00**	**CY**	**58,588**	**0**	**0**	**0**	**0**	**58,588**	
			5.87					*5.87*	
09 14 06 Access Road Surface	**9,000.00**	**SF**	**52,790**	**0**	**0**	**0**	**0**	**52,790**	
			1,098.33					*1,098.33*	
09 14 07 Cast-in-Place Concrete	**220.00**	**CY**	**241,632**	**0**	**0**	**0**	**0**	**241,632**	
			16.32					*16.32*	
09 02 14 01 Earthwork	**601.00**	**CY**	**9,810**	**0**	**0**	**0**	**0**	**9,810**	
			1,053.74					*1,053.74*	
09 02 14 02 Concrete	**220.00**	**CY**	**231,822**	**0**	**0**	**0**	**0**	**231,822**	
			1.74					*1.74*	

Labor ID: 01SC2013 EQ ID: EP11R07 Currency in US dollars TRACES MII Version 4.2

Description	Quantity	UOM	ContractCost	Escalation	Contingency	SIOH	MiscOwner	ProjectCost	C/O
09 14 08 Reinforcing Steel	**44,000.00**	**LB**	**76,364**	**0**	**0**	**0**	**0**	**76,364**	
			4,317.16					*4,317.16*	
09 14 09 Planting - Grasses on Banks	**0.52**	**ACR**	**2,245**	**0**	**0**	**0**	**0**	**2,245**	
09 15 Reach 15	**1.00**	**LS**	**2,234**	**0**	**0**	**0**	**0**	**2,234**	
			14.89					*14.89*	
09 15 01 Excavate and Haul	**150.00**	**CY**	**2,234**	**0**	**0**	**0**	**0**	**2,234**	
			33,293.23					*33,293.23*	
09 16 Reach 16	**1.00**	**EA**	**33,293**	**0**	**0**	**0**	**0**	**33,293**	
			27.40					*27.40*	
09 16 01 Excavate and Haul	**1,215.00**	**CY**	**33,293**	**0**	**0**	**0**	**0**	**33,293**	
18 Cultural Resources	**1.00**	**LS**	**109,000**	**0**	**0**	**0**	**0**	**109,000**	
			109,000.00					*109,000.00*	
18 01 Cultural Resources	**1.00**	**EA**	**109,000**	**0**	**0**	**0**	**0**	**109,000**	

Labor ID: 01SC2013 EQ ID: EP11R07 Currency in US dollars TRACES MII Version 4.2

GEOTECHNICAL EVALUATION

BERRYESSA CREEK PROJECT

APPENDIX B, Part IV: Design and Cost of Alternative - Geotechnical Evaluation

TABLE OF CONTENTS

1.1 INTRODUCTION

Geologic and geotechnical conditions along the Berryessa Creek Project alignment between Calaveras Boulevard and Old Piedmont Road were summarized in the Geotechnical Office Report prepared by Parikh Consultants, Inc. (Parikh Consultants 2004). The report included data from several previous geotechnical and environmental studies performed along or adjacent to the creek alignment. A total of 70 boring logs were compiled in the Parikh report. Although many of the borings do not include data that would be necessary for final design of the project, the number and depth of the existing borings are considered adequate for feasibility-level design purposes. The preliminary geotechnical assessment did not encounter geotechnical or geologic factors that would preclude successful completion of this project, however, there are a number of issues that will need to be considered and addressed in the final design.

1.2 GEOLOGIC CONDITIONS

Several different soil units were identified along the creek alignment and included:

- Basin Deposits (Holocene) – Composed predominantly of clays and silty clays
- Young Alluvial Fan Deposits (Holocene) – Composed of gravelly sand and sandy and clayey gravel near the fan heads and upstream, grading to sandy and silty clay within downstream reaches.
- Older Alluvial Fan Deposits (Holocene) – Composed of gravelly sand and sandy and clayey gravel near the fan heads and upstream, grading to sandy and silty clay within downstream reaches.
- Alluvial Fan Deposits (Upper Pleistocene) – Composed of gravel and cobbles with clayey and sandy matrix.

The report by Parikh Consultants (2004) describes the Hayward Fault as being 1.2 miles from the project site, however the State of California maps active faulting closer to the eastern limits of the project (CDMG 1982). It should be noted that immediately east of the project alignment (east of Old Piedmont Road) is hilly terrain that has been impacted by both faulting and landslides. The Berryessa Formation (composed of mudstone, sandstone, and conglomerate) is mapped in this area; however, the geology has been significantly disturbed by northwest-southeast trending faulting associated with the Hayward Fault Zone. Numerous southwest trending landslides have developed in the terrain. The current project limits for Berryessa Creek do not extend into the faulting and landslide areas, however, any future project development east of Old Piedmont Road (e.g., upstream detention basins) needs to consider the impacts of both active faulting and landslides.

1.3 GROUNDWATER CONDITIONS

Groundwater was encountered in many of the borings within the most downstream section of the creek alignment (Calaveras Boulevard to Montague Expressway) at depths varying from approximately 8 to 12 feet below existing grade. In the vicinity of I-680 groundwater was encountered at a depth of greater than 30 feet below existing grade. Within the upper portion of the creek alignment (upstream of I-680) groundwater was not noted in any of the exploratory borings presented in the Parikh report except for one boring upstream of Old Piedmont Road where groundwater was encountered approximately 17 feet below existing grade. The Parikh report did note that groundwater levels could vary in the future due to seasonal groundwater fluctuations, water elevation in the creek, surface run-off, and other hydrologic conditions.

1.4 SEISMIC CONDITIONS

The Parikh report estimated a potential for high seismic activity for the project alignment (peak bedrock acceleration of 0.7). Design of floodwalls, channel walls, bridges and levees will need to incorporate the appropriate seismic factors to account for this high potential for seismic activity. Depending on the results of pseudo-static analysis of structures and levees, more extensive dynamic analysis may be needed to evaluate potential deformation.

The Parikh report did recognize that deposits of loose to medium dense sands and silty sands encountered within the creek alignment may be susceptible to liquefaction. These deposits were predominantly encountered in the upstream portion of the creek. The overall liquefaction potential was preliminarily judged by the Parikh report to be low because of the discontinuous nature of the liquefaction-susceptible soils and the lack of high groundwater in the areas that they were encountered. However, further investigation and groundwater monitoring was recommended during the final design phase of the project. If a higher degree of liquefaction is identified, then the effects of seismic settlement and lateral spread on structures and levees will need to be considered.

1.5 STRUCTURE FOUNDATIONS

Structures for this project may include floodwalls, vertical channel walls, culverts, and bridge crossings. Due to the significant variability of soil conditions along the creek alignment, it is anticipated that each structure will require site specific foundation design. Foundation support for bridge replacements will likely require deep pile foundations. Culverts and low to medium height wall structures can likely be supported on grade, although removal and re-compaction of existing subgrade soils may be necessary. Higher walls (>10 feet height) may require pile foundation support depending on their location along the alignment. Where significant retained soil heights are required (channel walls), importing of select granular backfill may be preferable over on-site clayey soils.

1.6 LEVEE EMBANKMENTS

New or raised levees should be designed and constructed in accordance with U.S. Army Corps of Engineers Manual EM 1110-2-1913 ([USACE] 2000).

Seepage analysis of the proposed levee should consider both seepage through the levee embankment and under-seepage through the foundation soils. The potential for high uplift pressures and high exit gradients near the landside toe of the levee must be evaluated, particularly where more granular foundation soils exist near the surface. If the potential for these detrimental factors exist then some form of mitigation (impermeable cutoffs, slurry trenches, relief drains) will need to be considered.
Stability analysis of levee embankments should consider the following conditions.

- End of Construction – Utilizing undrained shear strength for clayey soils
- Sudden Drawdown – Including unbalanced pore pressures within the riverside slope.
- Long-Term Seepage Conditions – Utilizing long-term or steady state seepage
- Earthquake – Utilizing pseudo-static stability analysis. If soil liquefaction is an issue, an analysis using post-liquefied strengths should also be performed. Where factors of safety are less than 1.2, a seismic deformation analysis may also be required.

Immediate and long-term settlement of new and raised levee should be performed and the impact on required freeboard be evaluated. Mitigation of settlement can be achieved by several methods including pre-loading, ground improvement, or over-building of embankments.

1.7 CHANNEL/BASIN SLOPES

Slope stability analysis should be performed on channel slopes for static, pseudo-static conditions and sudden drawdown conditions. Constructed slopes should be suitably protected against erosion from local runoff and stream flow.

1.8 FUTURE INVESTIGATION

Additional investigation and analysis will be necessary during the final design phase of the project. In some areas it is anticipated that information from existing borings will be utilized in the design, however, where specific field or laboratory test data required for analysis and design is lacking, supplemental field exploration will be necessary. A preliminary guideline for future investigation and analysis is presented in Table 1.

Table 1 Additional Investigation and Analysis

Project Components	Field Exploration	Laboratory Testing	Analyses
Levee Embankments/ Channel Slopes	Frequency: Minimum 1 boring / 500 ft. Depth: At least 3 x levee/slope height, and at least 5 feet below potentially liquefiable soils.	• Dry Density • Moisture Content • Shear Strength • Consolidation • Gradation • Permeability	• Seepage Analysis • (through seepage and under-seepage) • Slope Stability Analysis • Settlement Analysis • Scour Potential
Floodwalls/ Channel Walls	Frequency: Minimum 1 boring/500 ft. Depth: At least 3 x wall/culvert, and at least 5 feet below potentially liquefiable soils	• Dry Density • Moisture Content • Shear Strength • Consolidation • Gradation • Corrosion	• Earth Pressures • Vertical & Lateral Bearing Capacity • Settlement • Overturning/Sliding
Bridge Replacements	Frequency: 1 boring/support Depth: Typically 70 to 100 feet depending on loading conditions	• Dry Density • Moisture Content • Shear Strength • Consolidation • Gradation • Corrosion Potential	• Footing Bearing Capacity • Vertical and Lateral Pile Capacity • Earth Pressures • Seismic Design Parameters

1.9 REFERENCES

California Division of Mines and Geology (CDMG), 1982. State of California Special Studies Zone, Calaveras Reservoir. Effective January 1, 1882.

Parikh Consultants Inc., 2004. Geotechnical Office Report, Coyote and Berryless Creek, General Re-Evaluation Study for Proposed Project Modifications, Santa Clara County, California. April 2004).

United States Army Corps of Engineers (USACE), 2000. Engineers Manual EM 1110-2-1913 Design and Construction of Levees. April 30, 2000.

DRAFT DESIGN SHEETS

INCIDENTAL RECREATIONAL FEATURES

PLAN
SCALE IN FEET:

LEGEND:
- ACCESS POINT WITH BENCH AND SIGNAGE
- A/C TRAIL SURFACE, 15 FT WIDE

CALAVERAS BLVD
LOS COCHES ST
PIEDMONT CREEK
YOSEMITE DR
AMES AVE
UPRR CULVERT
UPRR TRESTLE
MONTAGUE EXPY
INTERSTATE 680

120+00 125+00 130+00 135+00 140+00 145+00 150+00 155+00 160+00 165+00 170+00 175+00 180+00 185+00 190+00 195+00 200+00 205+00 210+00 215+00 220+00 225+00 230+00 235+00 240+00 245+00 250+00

BEGIN PROJECT
STA 129+80

ACCESS POINT WITH
BENCH AND SIGNAGE

15' WIDE OBSTRUCTION-FREE ZONE
WITH INCIDENTAL A/C RECREATIONAL TRAIL

END PROJECT
STA 237+00

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Design file no: N/A		
Drawing Code:		
Designed by: PRELIMINARY	Spec No.: N/A	File name: BER PP C-2X
Dwn by: KP		Plot date: DEC 22, 2011
Reviewed by: RM	Submitted by: CHIEF, CIV ENGR DES SEC A	Plot scale: 50/100

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SACRAMENTO DISTRICT
IN PARTNERSHIP WITH:
SANTA CLARA VLY WATER DISTRICT

PREPARED BY:
TETRA TECH, INC.
17887 VON KARMAN AVE, STE 500
IRVINE, CA 92614

SANTA CLARA COUNTY CALIFORNIA
BERRYESSA CREEK PROJECT
GENERAL REEVALUATION STUDY
ALTERNATIVES FORMULATION

INCIDENTAL RECREATIONAL FEATURES

Sheet reference number:
R1
Sheet 1 of 1

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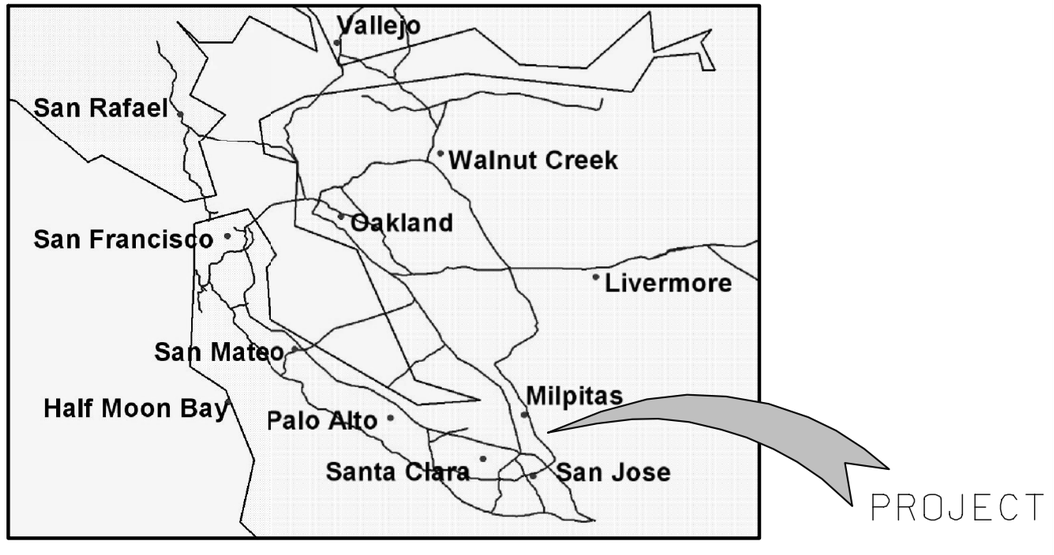
BERRYESSA CREEK PROJECT
GENERAL REEVALUATION STUDY
ALTERNATIVES FORMULATION

SANTA CLARA COUNTY
CALIFORNIA

PLAN AND PROFILE VIEWS

FY_12



VICINITY MAP

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Drawn by: KP | Spec No.: N/A | Design file no: N/A
Reviewed by: RM | Drawing Code:
Submitted by: CHIEF, CIV ENGR DES SEC A | File name: BER PP C-XX | Plot date: DEC 22, 2011 | Plot scale: 50/100

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SANTA CLARA COUNTY CALIFORNIA
BERRYESSA CREEK PROJECT
GENERAL REEVALUATION STUDY
ALTERNATIVES FORMULATION

PROJECT ALTERNATIVES
PLAN AND PROFILE VIEW
TITLE SHEET

Sheet reference number:
G1
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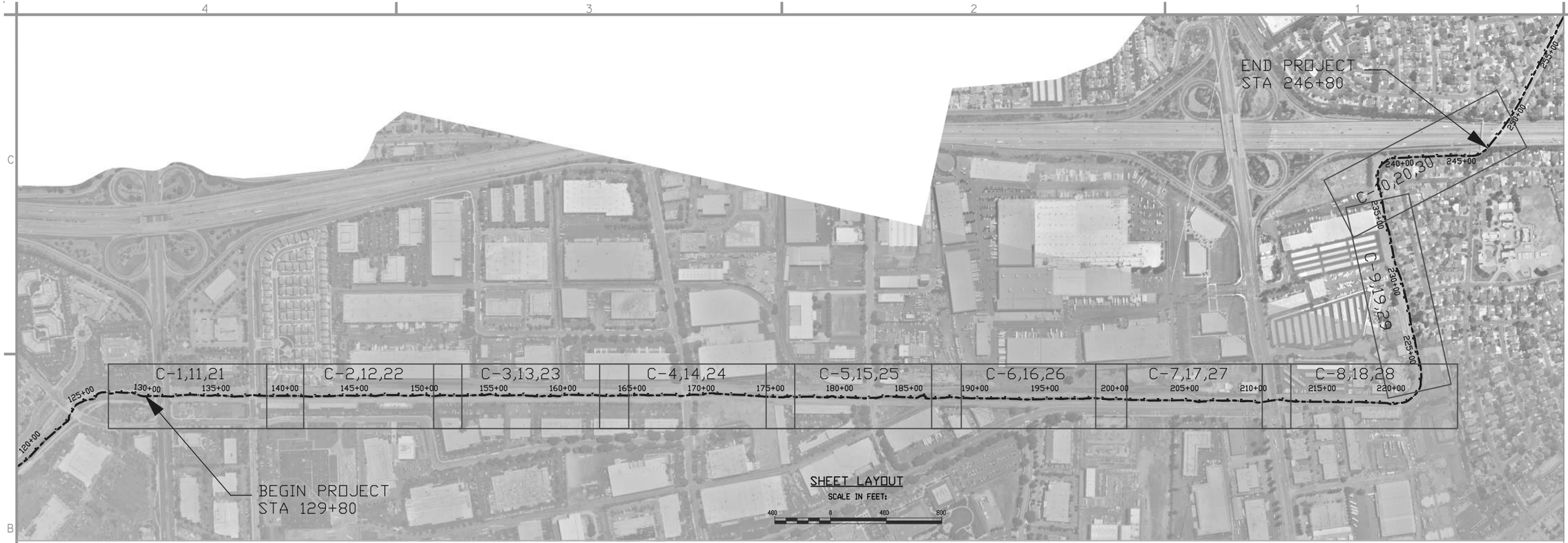
8.1.1



ABBREVIATIONS

ACC	ACCORDING
APPROX	APPROXIMATE
BDY	BOUNDARY
BOB	BASIS OF BEARING
BM	BENCHMARK
CH	CHANNEL
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CY	CUBIC YARD
D/S	DOWNSTREAM
DIA	DIAMETER
EG	EXISTING GROUND
FG	FINISH GRADE
E	EAST, EASTING
EA	EACH
EL	ELEVATION
EXIST	EXISTING
FT	FOOT, FEET
IE	INVERT ELEVATION
INV	INVERT
LF	LINEAR FOOT
MAX	MAXIMUM
MIN	MINIMUM
N	NORTH, NORTHING
NAD	NORTH AMERICAN DATUM
N/A	NOT APPLICABLE
NGVD	NATIONAL GEODETIC VERTICAL DATUM
NTS	NOT TO SCALE
PCL	PRIMARY CONTROL LINE
PROP	PROPOSED
PT	POINT
RCP	REINFORCED CONCRETE PIPE
ROW	RIGHT OF WAY
S	SOUTH
SCVWD	SANTA CLARA VALLEY WATER DISTRICT
SHT	SHEET
SS	SIDE SLOPE
SF	SQUARE FEET
STA	STATION
TOB	TOP OF BANK
TOW	TOP OF WALL
TYP	TYPICAL
U/S	UPSTREAM
UPRR	UNION PACIFIC RAILROAD
USACE	UNITED STATES ARMY CORPS OF ENGINEERS
VCP	VITRIFIED CLAY PIPE
VERT	VERTICAL
W	WEST
WSEL	WATER SURFACE ELEVATION

SHEET INDEX

NOTES

1. ALL PROJECT FEATURES SHOWN ARE PRELIMINARY IN NATURE AND ARE TO BE USED FOR PLANNING PURPOSES ONLY.
2. CONTROL LINE FROM HEC-GEORAS STATIONING, USACE 2004.
3. 2' CONTOUR INTERVAL TOPOGRAPHY AND DIGITAL ORTHOPHOTO USACE 2002.
4. PARCEL DATA FROM SCVWD 2009 BOUNDARY SURVEY.
5. ALL MAPPING IS PROJECTED TO NAD 83 STATE PLACE CALIFORNIA ZONE 3. VERTICAL DATUM IS NAVD 88. UNITS ARE SURVEY FEET.
6. WATER SURFACE ELEVATIONS ARE SHOWN FOR BASED ON HEC-RAS MODELING BY TETRA TECH USING UNSTEADY FLOWS WITHOUT UPSTREAM PROJECT IMPROVEMENTS IN PLACE.
7. DESIGN WATER SURFACE ELEVATION PROFILE FOR ALTERNATIVE 2A/d IS THE 0.01 WSEL AT 50% CERTAINTY ASSUMING NO FUTURE UPSTREAM IMPROVEMENTS BY SCVWD.
8. UPPER DESIGN WATER SURFACE ELEVATION PROFILE FOR ALTERNATIVES 2B/d AND 4/d IS THE 0.01 WSEL AT 50% CERTAINTY ASSUMING FUTURE UPSTREA,M IMPROVEMENTS (SCVWD OBJECTIVE). DESIGN FLOODWALL HEIGHTS AND TOP OF BANK ELEVATIONS ARE BASED ON 95% CERTAINTY CRITERIA APPLIED TO THIS WSEL.
9. LOWER DESIGN WATER SURFACE ELEVATION PROFILE FOR ALTERNATIVES 2B/d AND 4/d IS THE 0.01 WSEL AT 50% CERTAINTY ASSUMING NO FUTURE UPSTREAM IMPROVEMENTS BY SCVWD.
10. CROSS SECTIONS ARE SHOWN LOOKING DOWNSTREAM AND ARE NOT TO SCALE.

LEGEND

EXISTING FEATURES (PLAN VIEW)

- 2' CONTOUR
- PARCEL LINE
- STRUCTURE
- WATER/SEWER/STORM UTILITY
- ELEC/TEL/CABLE UTILITY

PROPOSED FEATURES (PLAN VIEW)

- CONTROL LINE
- STRUCTURE
- TOP OF SLOPE
- TOE OF SLOPE
- LIMIT OF CONSTRUCTION
- TEMPORARY CONSTRUCTION EASEMENT
- TEMPORARY STAGING AREA

EXISTING FEATURES (PROFILE VIEW)

- TOP OF BANK
- THALWEG

PROPOSED FEATURES (PROFILE VIEW)

- TOP OF WALL/MAT
- WATER SURFACE ELEVATION
- VEGETATED BENCH
- THALWEG

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Prior scale: 50'x100'

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SANTA CLARA COUNTY
CALIFORNIA
BERRYESSA CREEK PROJECT
GENERAL REEVALUATION STUDY
ALTERNATIVES FORMULATION

PROJECT ALTERNATIVES
PLAN AND PROFILE VIEW
INDEX, LEGEND, AND ABBREVIATIONS

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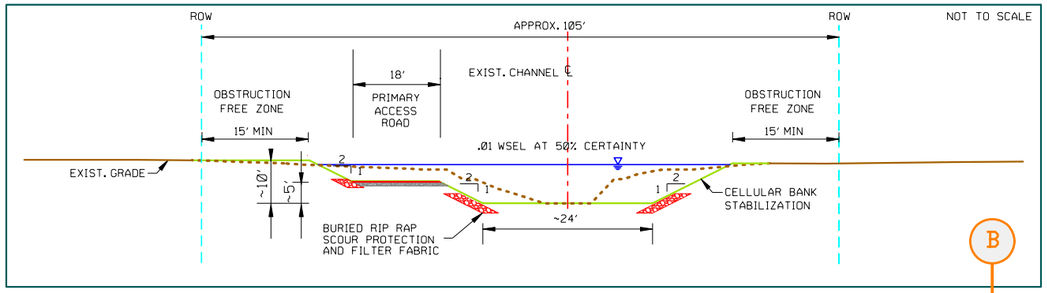

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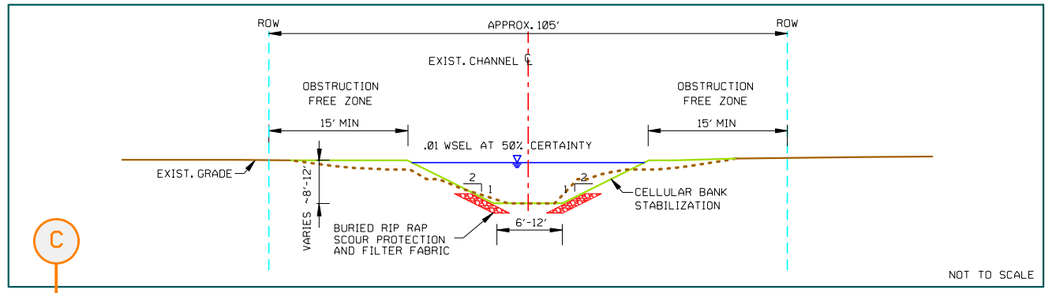
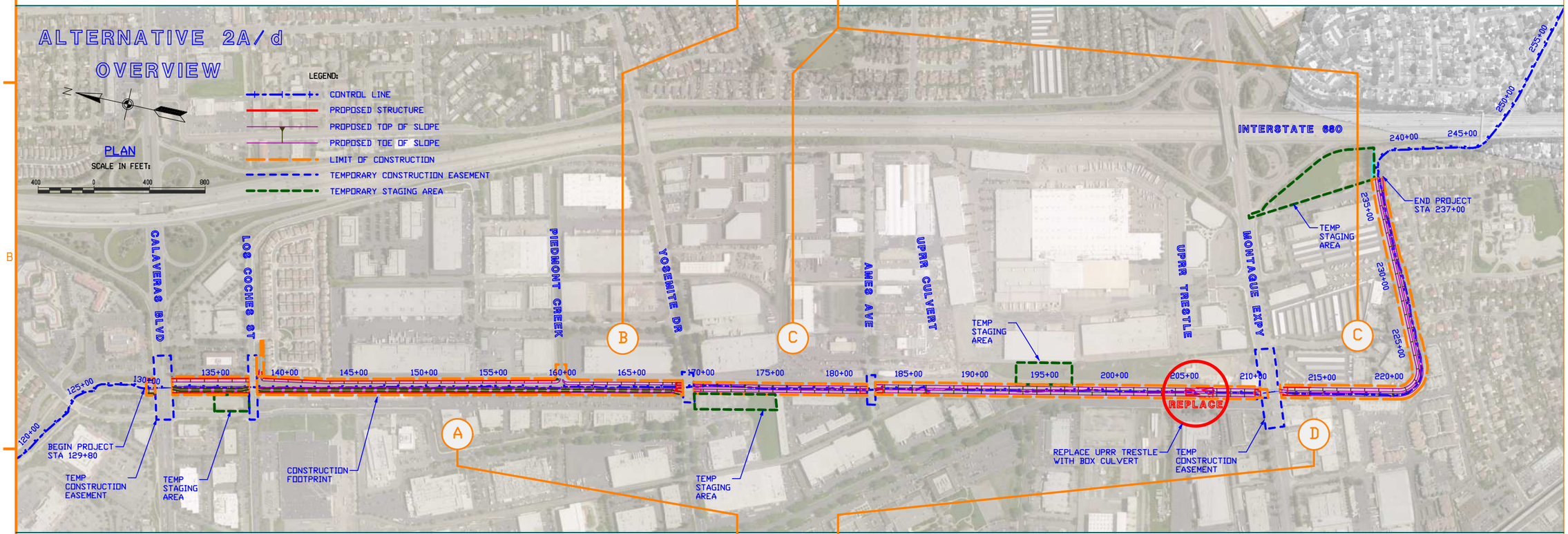
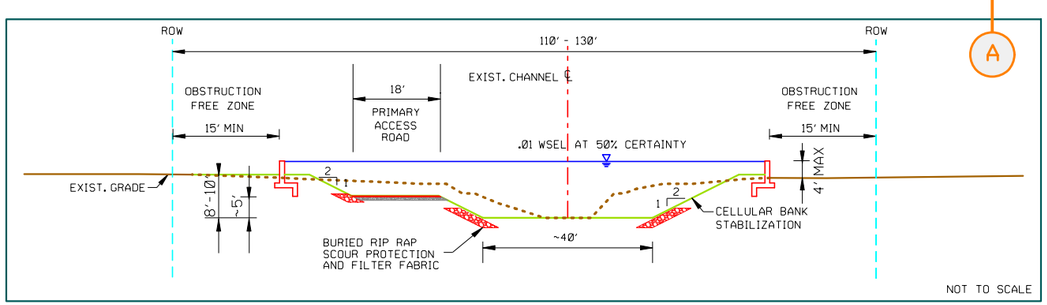


TYPICAL CROSS SECTION YOSEMITE DR TO I-680 (STA 170 TO 212 AND 214 TO 237)





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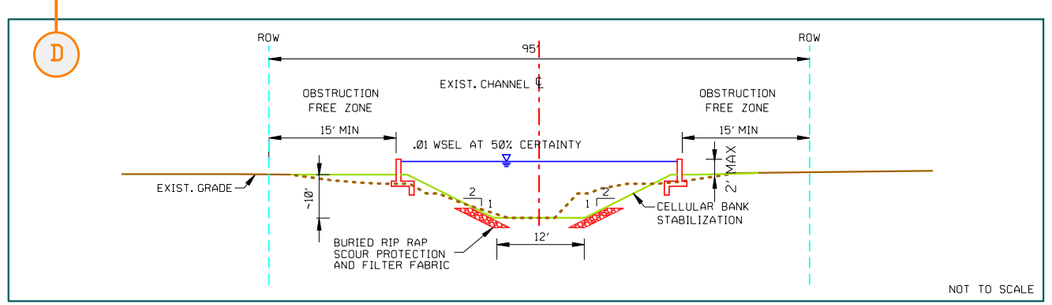

TYPICAL CROSS SECTION, MONTAGUE EXPY TO 200' UPSTREAM (STA 212 TO 214)

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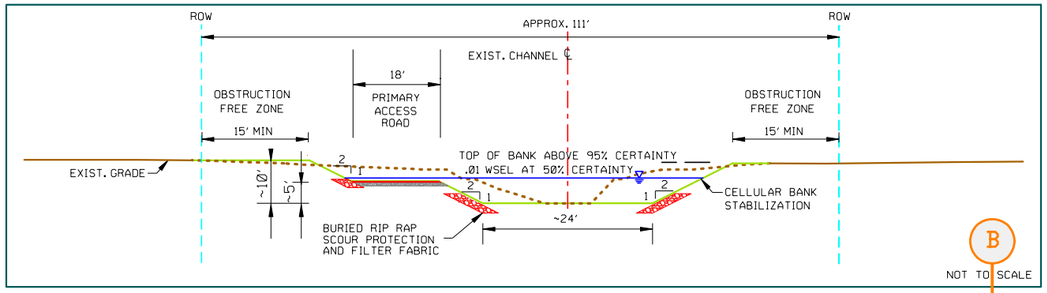

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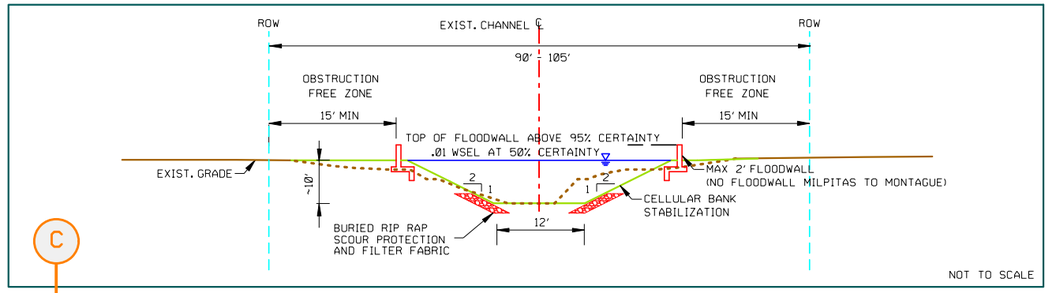

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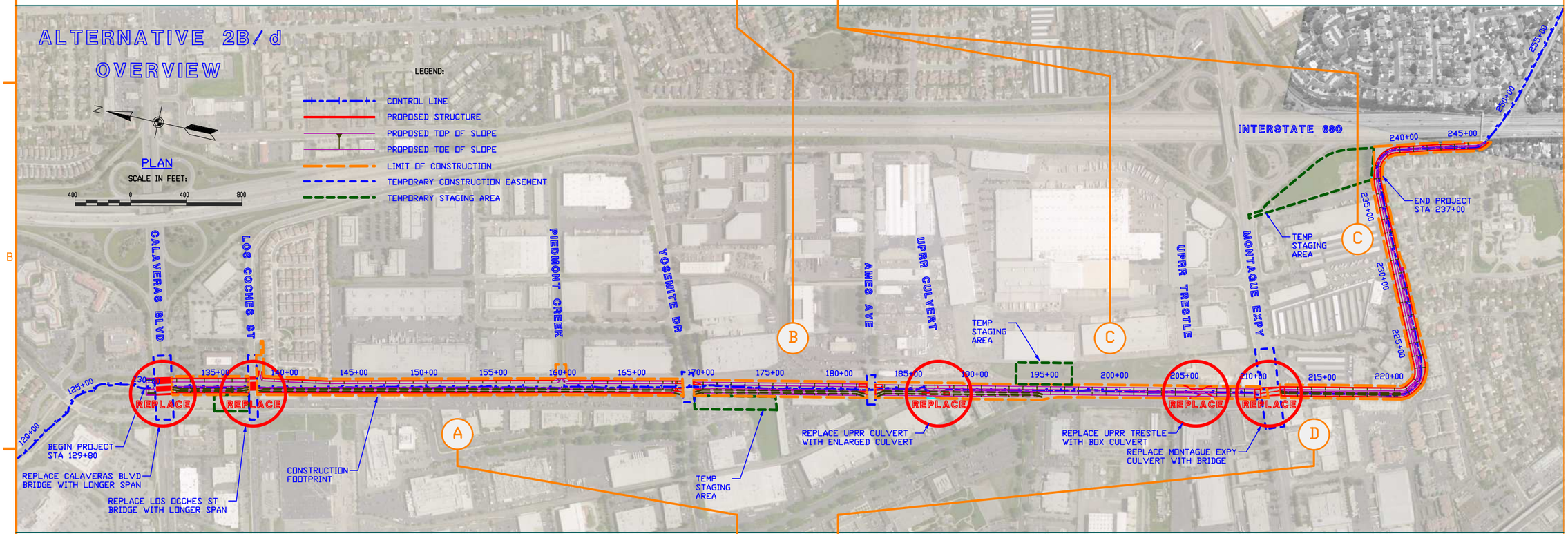
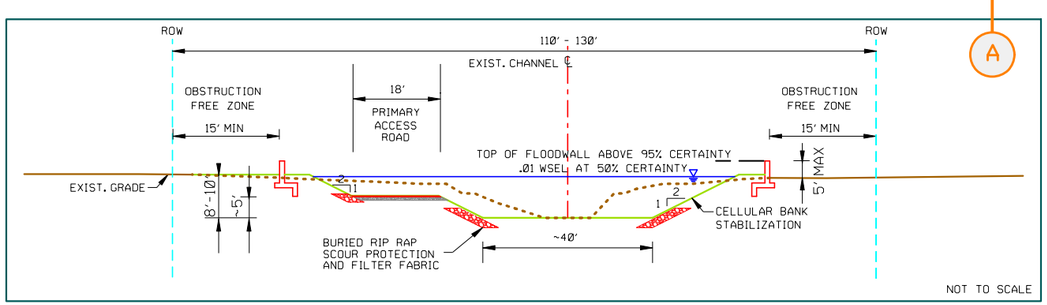
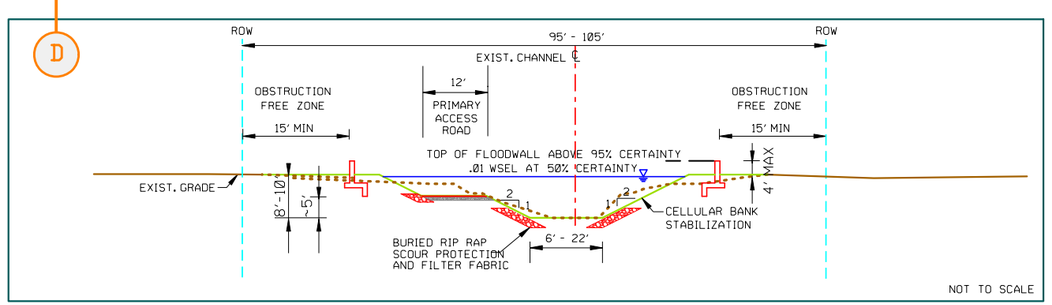




TYPICAL CROSS SECTION, CALAVERAS BLVD TO YOSEMITE DR (STA 130 TO 170)



TYPICAL CROSS SECTION, MONTAGUE EXPY TO LAKEWOOD CT (STA 212 TO 230)

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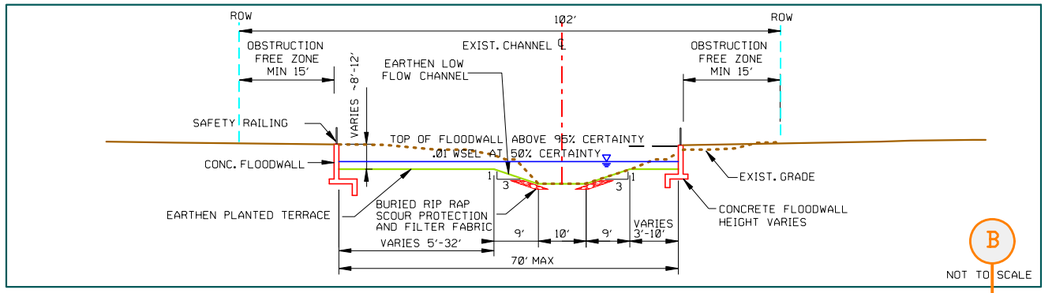

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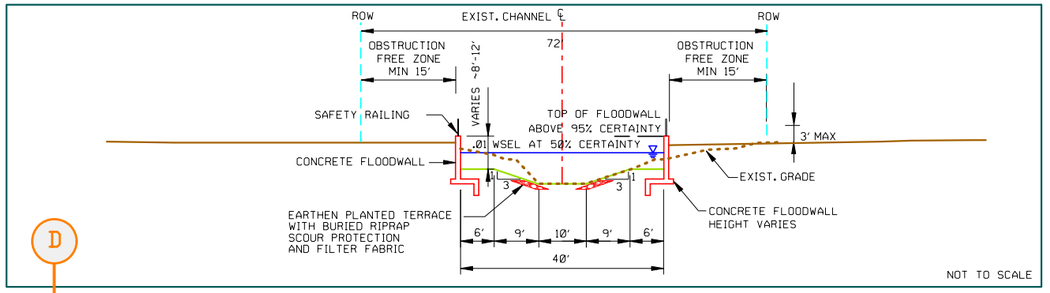
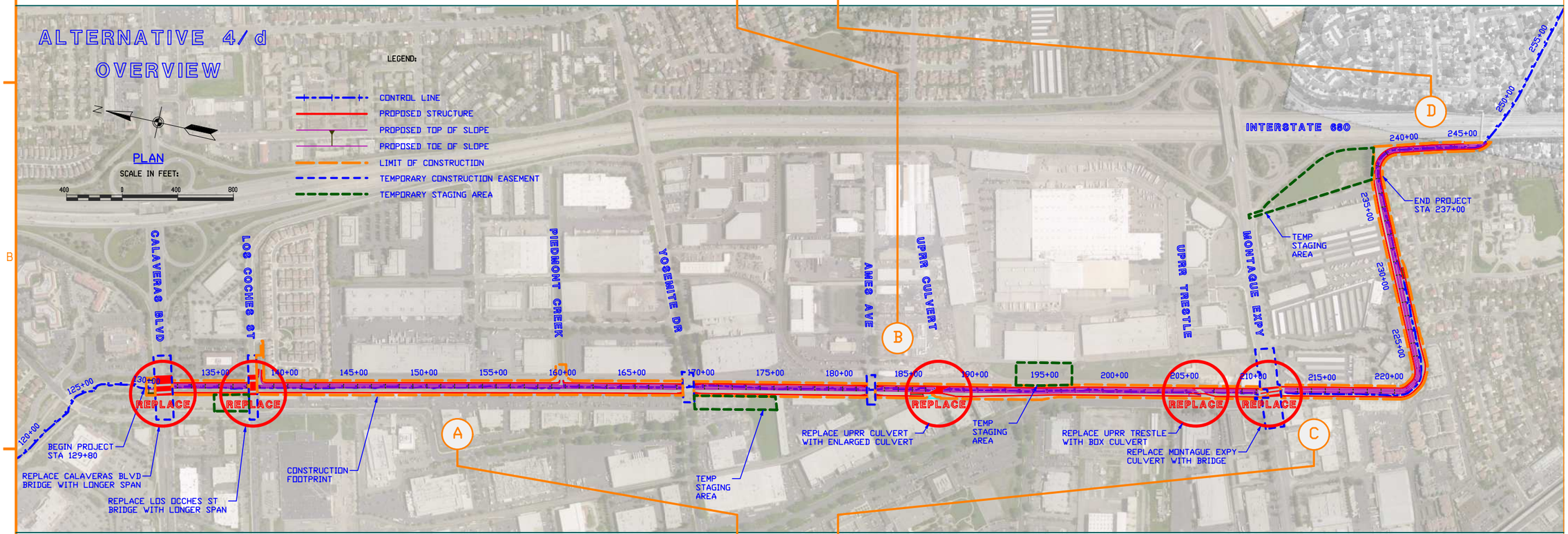
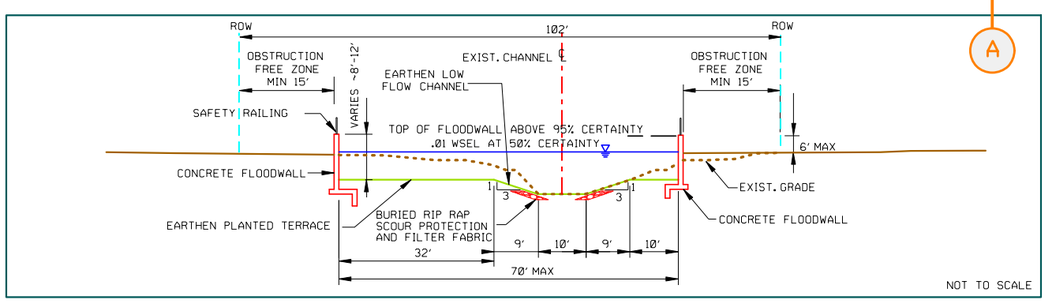
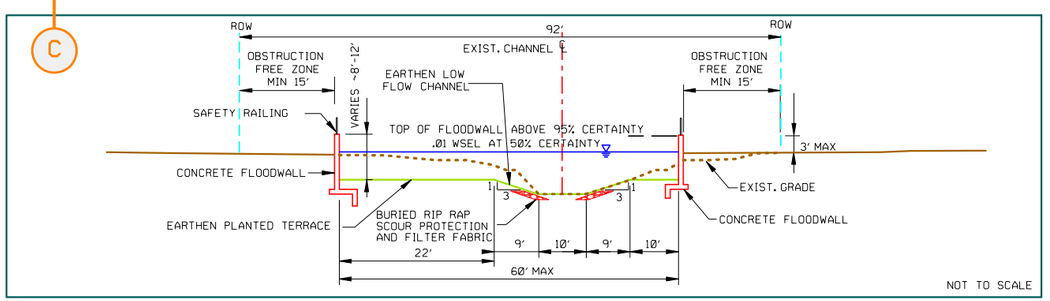


TYPICAL CROSS SECTION LAKEWOOD CT TO I-680 (STA 230 TO 248)





TYPICAL CROSS SECTION, CALAVERAS BLVD TO AMES AVE (STA 130 TO 182)



TYPICAL CROSS SECTION, MILPITAS BLVD TO LAKEWOOD CT (STA 195 TO 230)

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US Army Corps of Engineers
Sacramento District

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Date: JAN 17, 2012 | Rev. N/A
Design file no: N/A
Drawing Code: N/A
File name: BER PP C-XX
Print date: DEC 22, 2011
Print scale: 50/100

Designed by: PRELIMINARY
Dwn by: KP
Spec No.:
Reviewed by: RM
Submitted by:
CHIEF, CIV ENGR DES SEC A

U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
IN PARTNERSHIP WITH:
SANTA CLARA VLY WATER DISTRICT

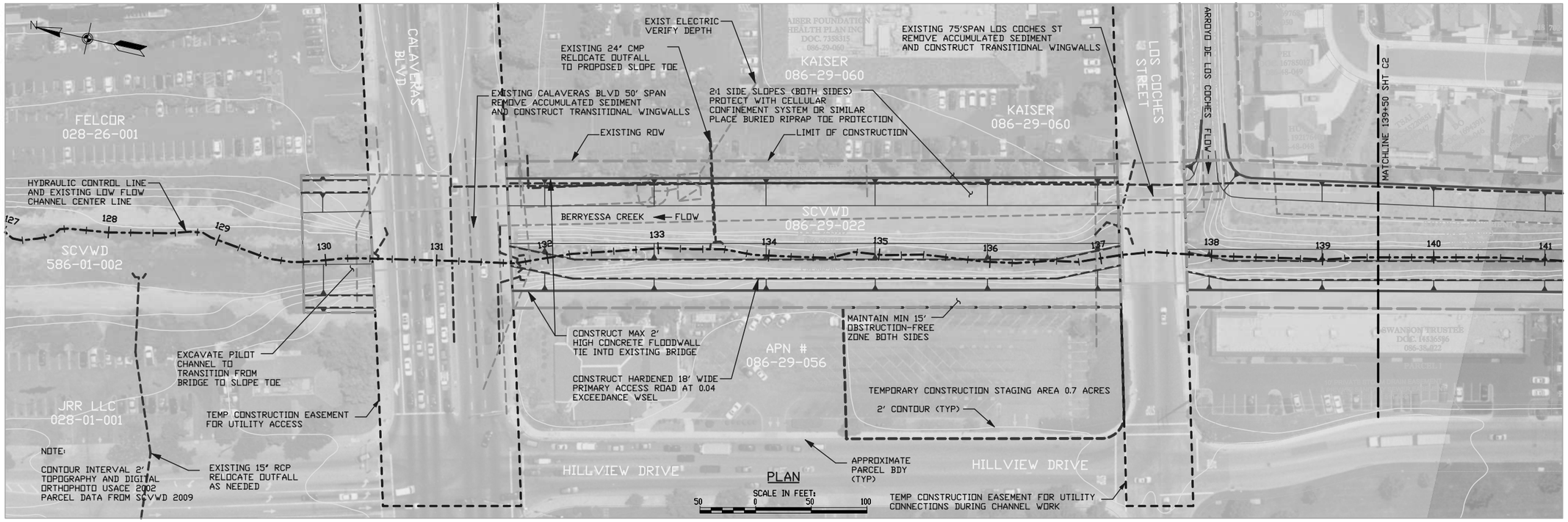
PREPARED BY:
TETRA TECH, INC.
17885 VON KARMAN AVE STE 500
IRVINE, CA 92614

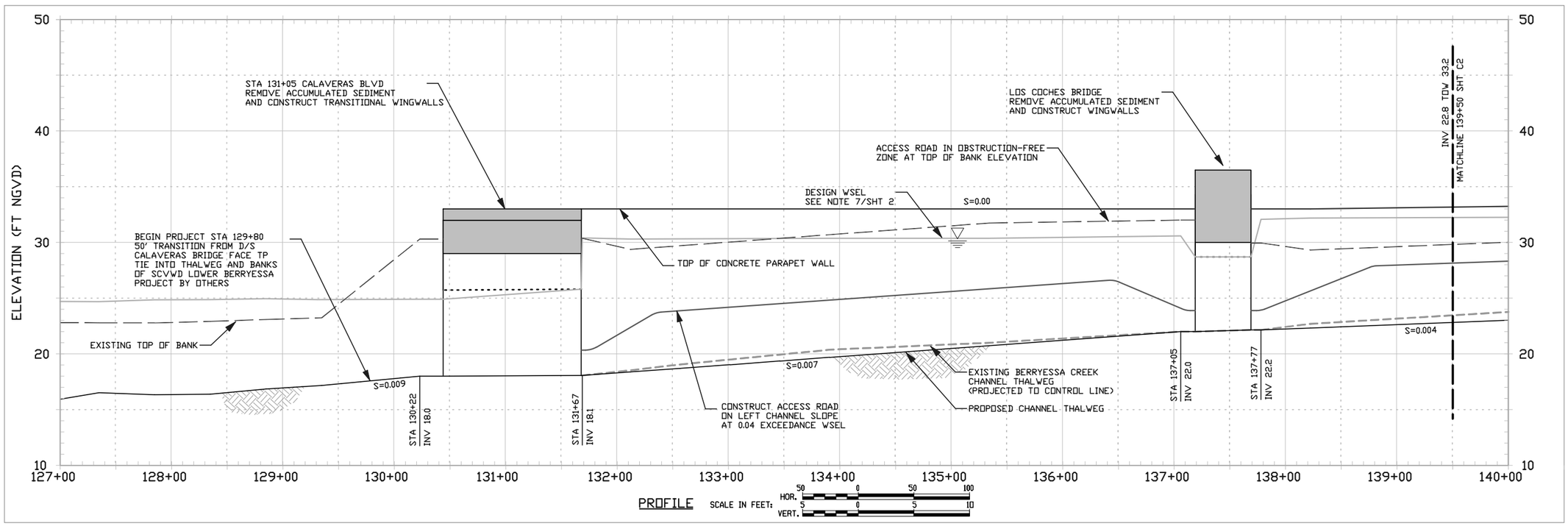
SANTA CLARA COUNTY CALIFORNIA
BERRYESSA CREEK PROJECT
GENERAL REEVALUATION STUDY
ALTERNATIVES FORMULATION

ALTERNATIVE 4/d
OVERVIEW EXHIBIT

Sheet reference number:
G5
Sheet 5 of 35

8.1.1





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US Army Corps of Engineers
Sacramento District

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Date: JAN 17, 2012 Rev. N/A
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Dwn by: KP Drawing Code:
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CHIEF, CIV ENGR DES SEC A
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Plot date: DEC 22, 2011
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U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
IN PARTNERSHIP WITH:
SANTA CLARA VLY WATER DISTRICT

PREPARED BY:
TETRA TECH, INC.
17770 CARTWRIGHT, STE. 500
IRVINE, CA 92614

SANTA CLARA COUNTY
CALIFORNIA
BERRYESSA CREEK PROJECT
GENERAL REEVALUATION STUDY
ALTERNATIVES FORMULATION

ALTERNATIVE 2A/d
PLAN AND PROFILE VIEW
STA. 127+00 TO 140+00

Sheet reference number:
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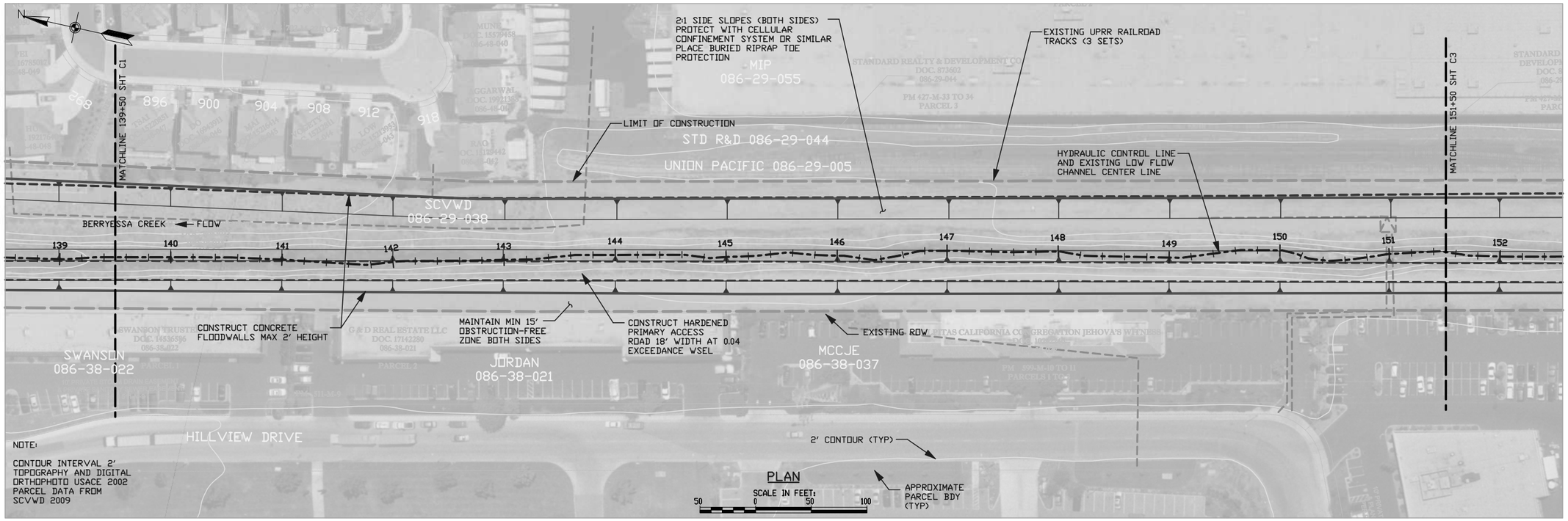
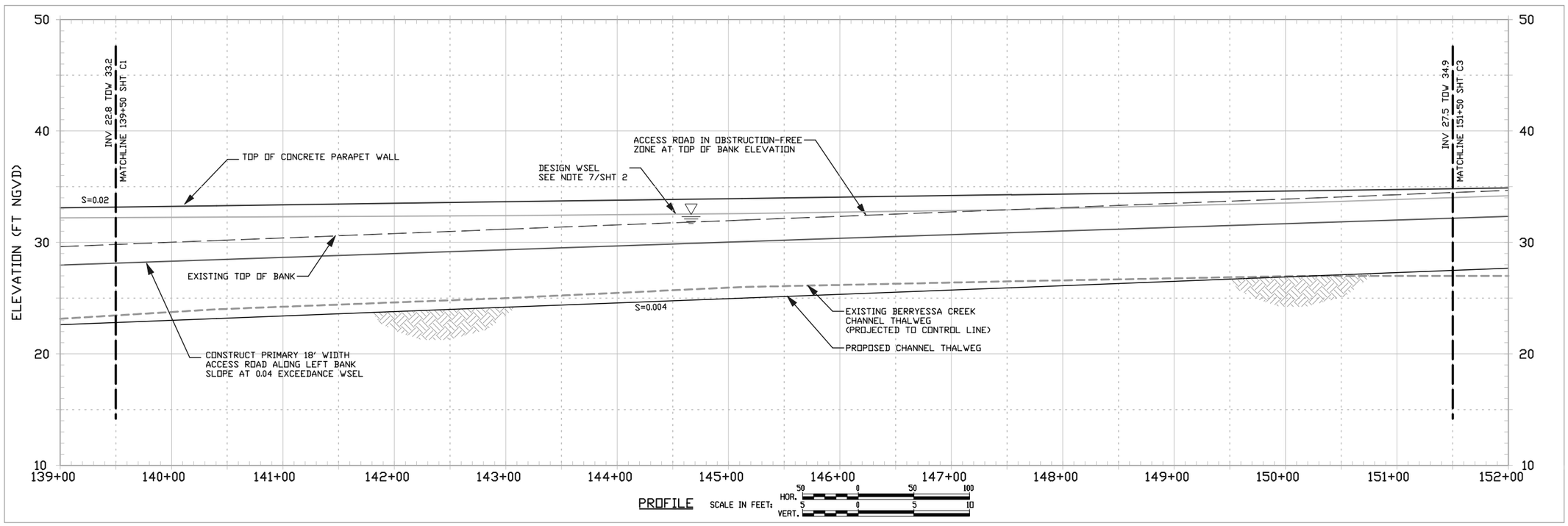
Sheet 6 of 35





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US Army Corps of Engineers
Sacramento District

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U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
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SANTA CLARA VLY WATER DISTRICT

PREPARED BY:
TETRA TECH, INC.
17770 CARTWRIGHT, STE. 500
IRVINE, CA 92614

SANTA CLARA COUNTY
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BERRYESSA CREEK PROJECT
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ALTERNATIVES FORMULATION

ALTERNATIVE 2A/d
PLAN AND PROFILE VIEW
STA. 139+00 TO 152+00

Sheet reference number:
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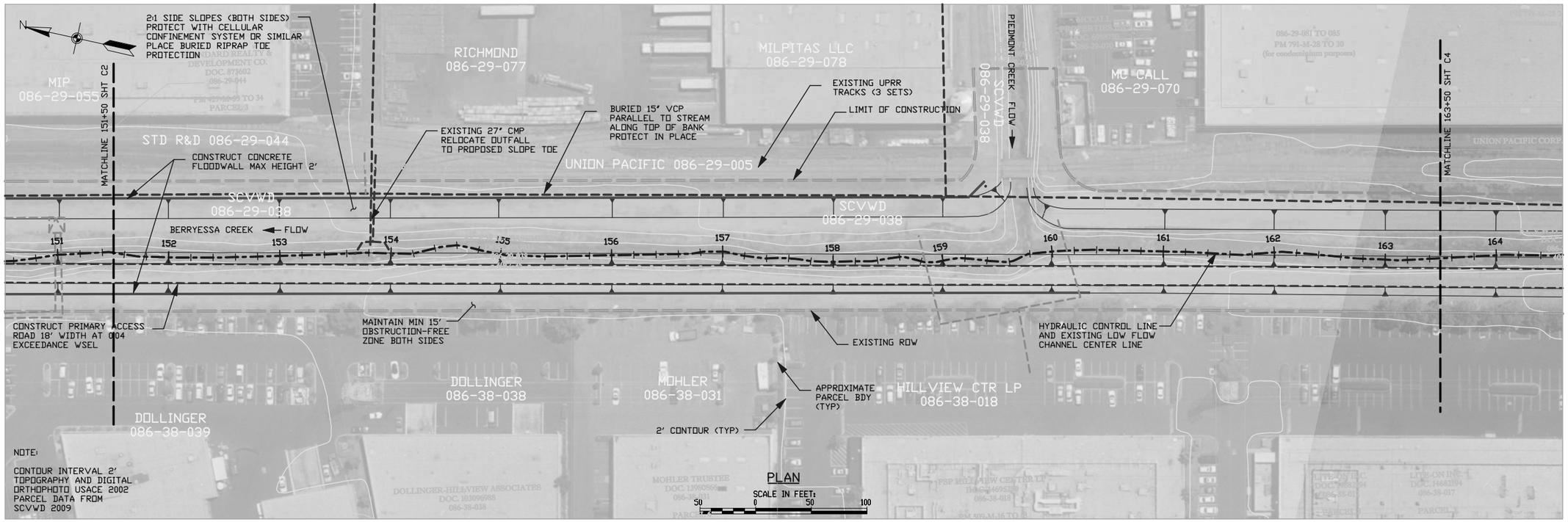

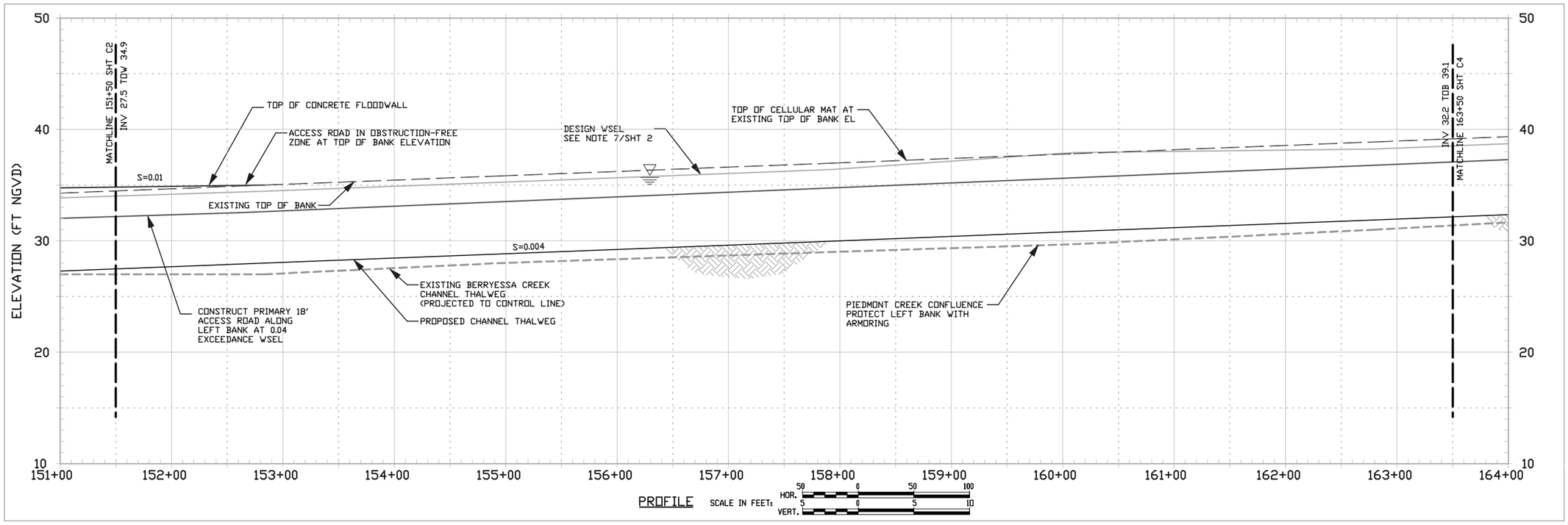

US Army Corps of Engineers
Sacramento District

Date Approved | Description | Symbol

Designed by: PRELIMINARY
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Reviewed by: RM
Submitted by: Chief, CIV ENGR DES SEC A
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U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
IN PARTNERSHIP WITH:
SANTA CLARA VLY WATER DISTRICT

PREPARED BY:
TETRA TECH, INC.
17770 CARTWRIGHT, STE. 500
IRVINE, CA 92614

SANTA CLARA COUNTY CALIFORNIA
BERRYESSA CREEK PROJECT
GENERAL REEVALUATION STUDY
ALTERNATIVES FORMULATION

ALTERNATIVE 2A/d
PLAN AND PROFILE VIEW
STA. 151+00 TO 164+00

Sheet reference number:
C3
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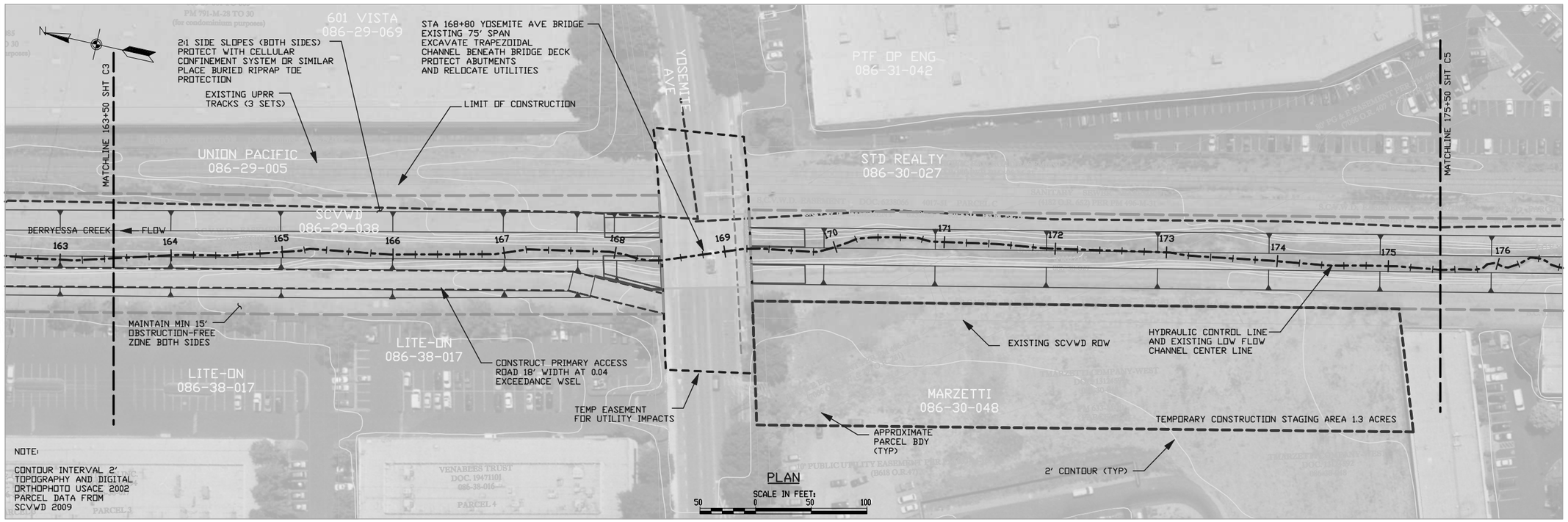

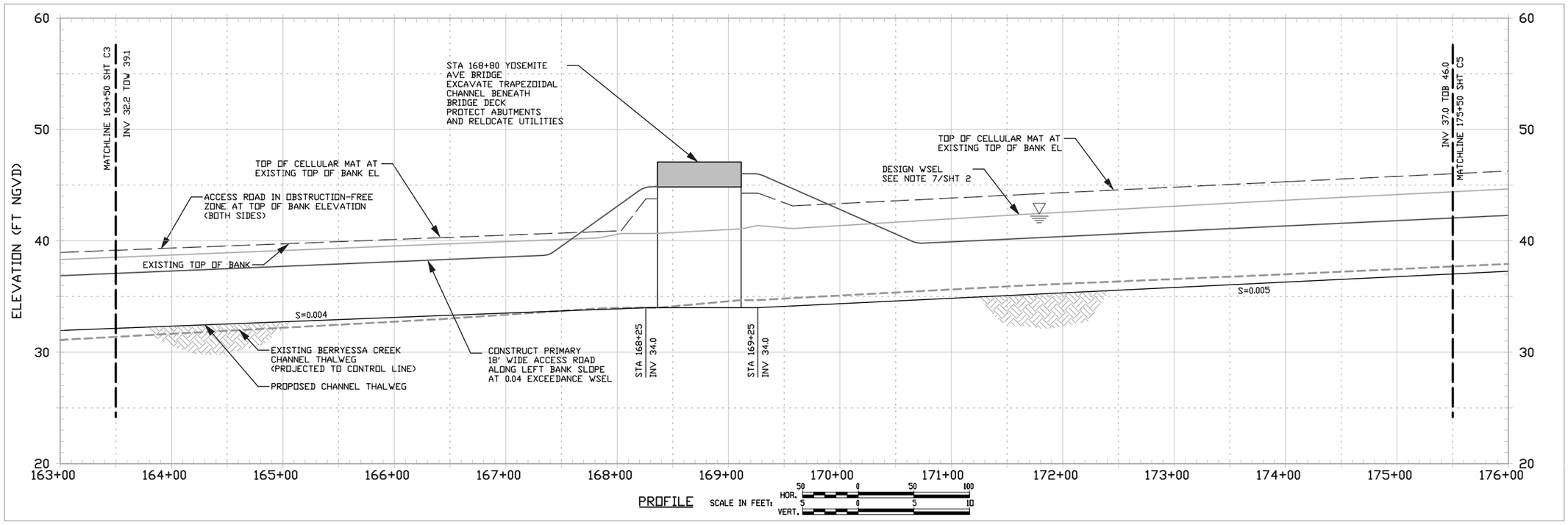

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US Army Corps of Engineers
Sacramento District

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Submitted by: CHIEF, CIV ENGR DES SEC A
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Prior scale: 50/100

U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
IN PARTNERSHIP WITH:
SANTA CLARA VLY WATER DISTRICT

PREPARED BY:
TETRA TECH, INC.
17770 CARTWRIGHT, STE. 500
IRVINE, CA 92614

SANTA CLARA COUNTY CALIFORNIA
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ALTERNATIVES FORMULATION

ALTERNATIVE 2A/d
PLAN AND PROFILE VIEW
STA. 163+00 TO 176+00

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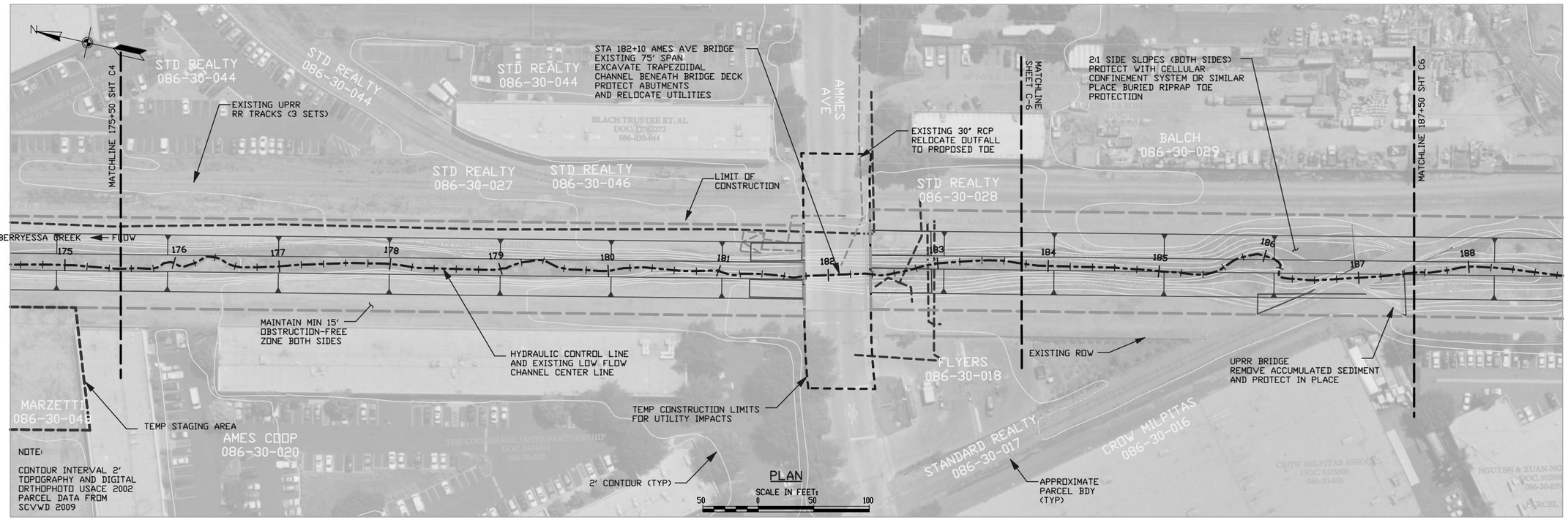
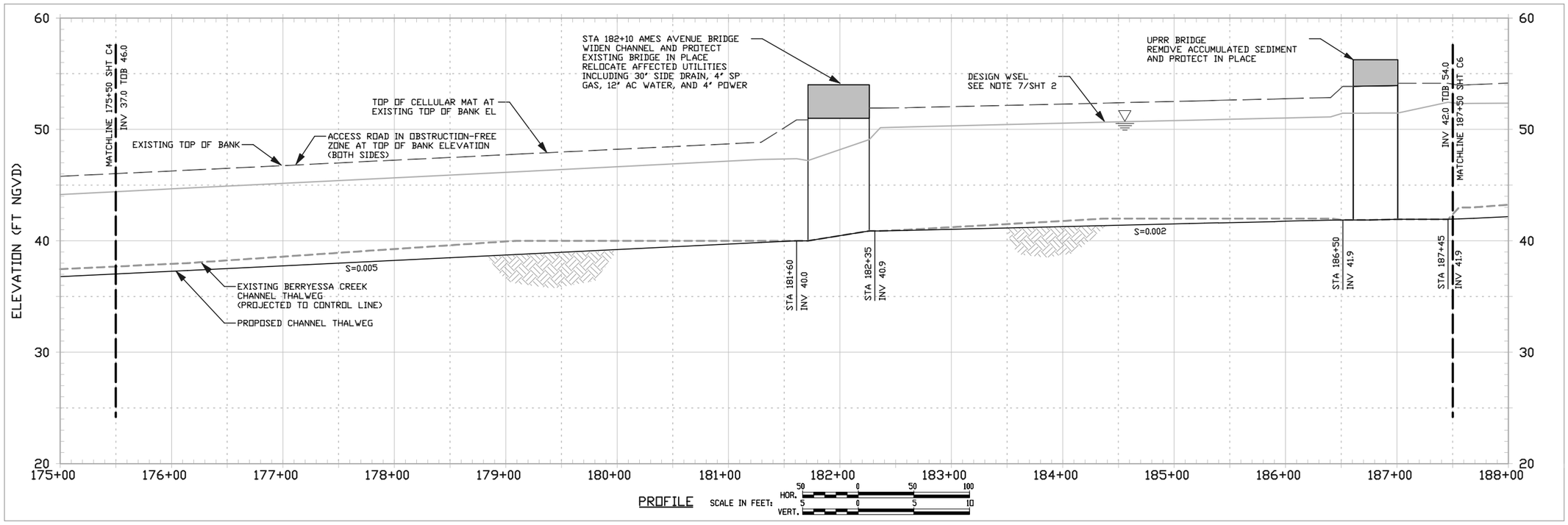
C4
Sheet 9 of 35





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Drawing Code:
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Plot date: DEC 22, 2011
Plot scale: 50/100

U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
IN PARTNERSHIP WITH:
SANTA CLARA VLY WATER DISTRICT

PREPARED BY:
TETRA TECH, INC.
17770 CARTWRIGHT, STE. 500
IRVINE, CA 92614

SANTA CLARA COUNTY CALIFORNIA
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ALTERNATIVES FORMULATION

ALTERNATIVE 2A/d
PLAN AND PROFILE VIEW
STA. 175+00 TO 188+00

Sheet reference number:
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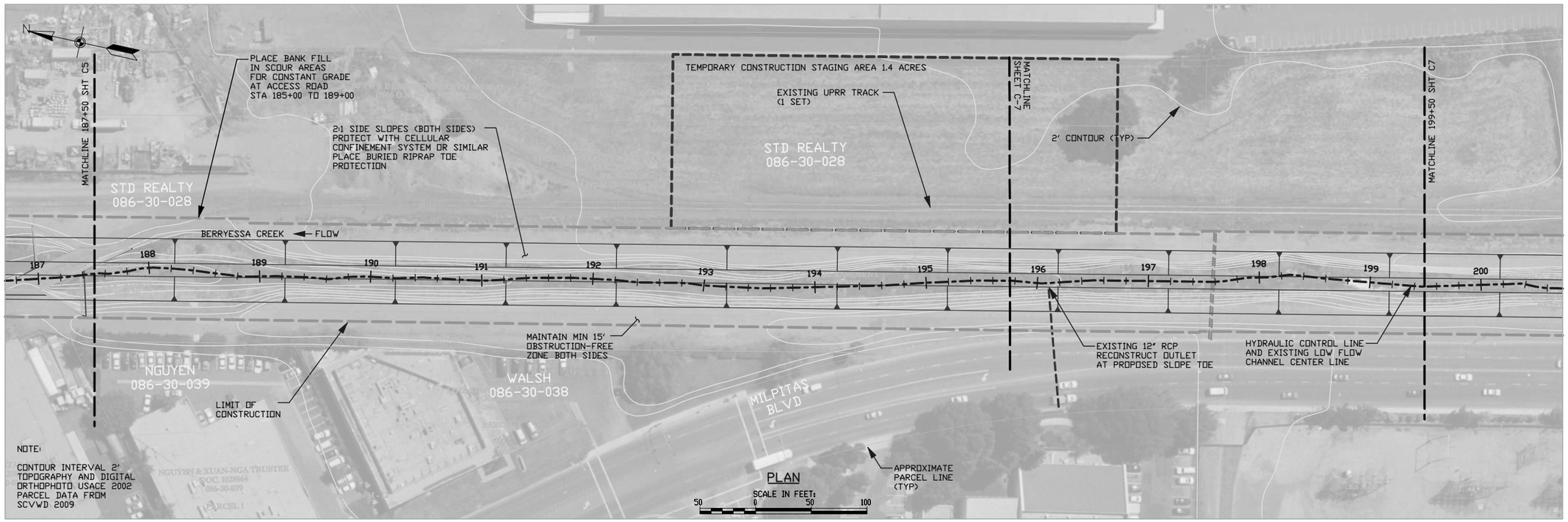

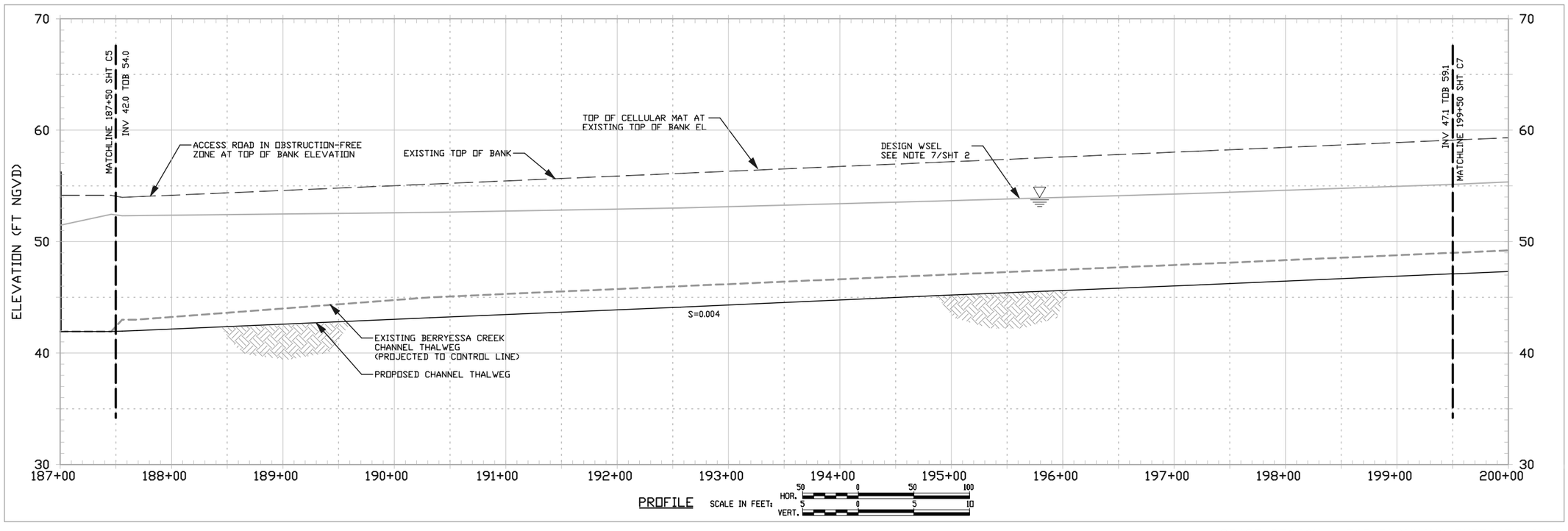

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US Army Corps of Engineers
Sacramento District

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Submitted by: CHIEF, CIV ENGR DES SEC A
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Drawing Code:
File name: BER PP C-XX
Prior date: DEC 22, 2011
Prior scale: 50/100

U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
IN PARTNERSHIP WITH:
SANTA CLARA VLY WATER DISTRICT

PREPARED BY:
TETRA TECH, INC.
17770 CARTWRIGHT, STE. 500
IRVINE, CA 92614

SANTA CLARA COUNTY
CALIFORNIA
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GENERAL REEVALUATION STUDY
ALTERNATIVES FORMULATION

ALTERNATIVE 2A/d
PLAN AND PROFILE VIEW
STA. 184+00 TO 197+00

Sheet reference number:
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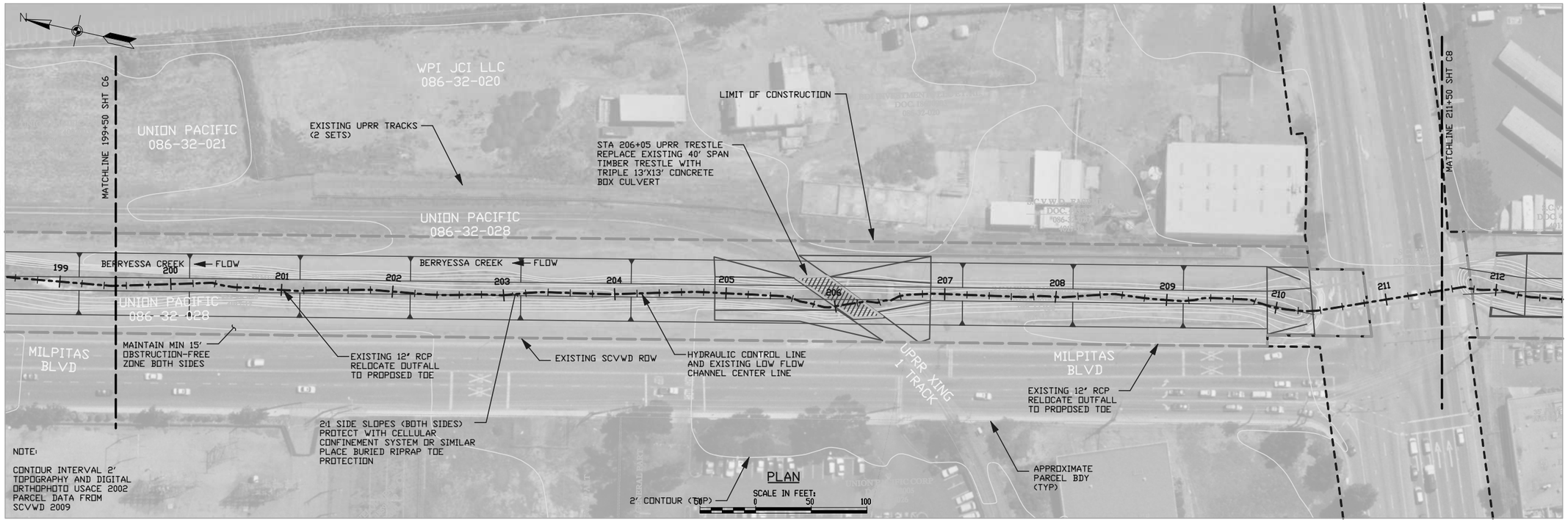
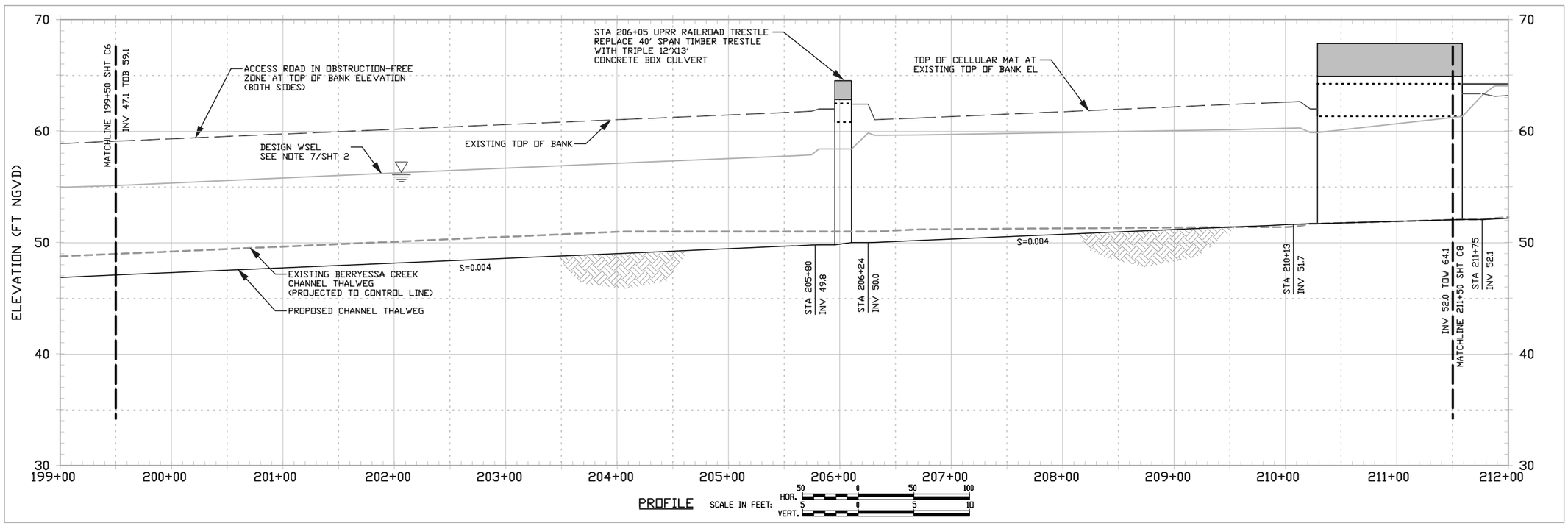
Sheet 11 of 35





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US Army Corps of Engineers
Sacramento District

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Date: JAN 17, 2012 | Rev. N/A
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Reviewed by: RM
Submitted by:
CHIEF, CIV ENGR DES SEC A
File name: BER PP C-XX
Prior date: DEC 22, 2011
Prior scale: 50/100

U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
IN PARTNERSHIP WITH:
SANTA CLARA VLY WATER DISTRICT

PREPARED BY:
TETRA TECH, INC.
17770 CARTWRIGHT, STE. 500
IRVINE, CA 92614

SANTA CLARA COUNTY
CALIFORNIA
BERRYESSA CREEK PROJECT
GENERAL REEVALUATION STUDY
ALTERNATIVES FORMULATION

ALTERNATIVE 2A/d
PLAN AND PROFILE VIEW
STA. 199+00 TO 212+00

Sheet reference number:
C7
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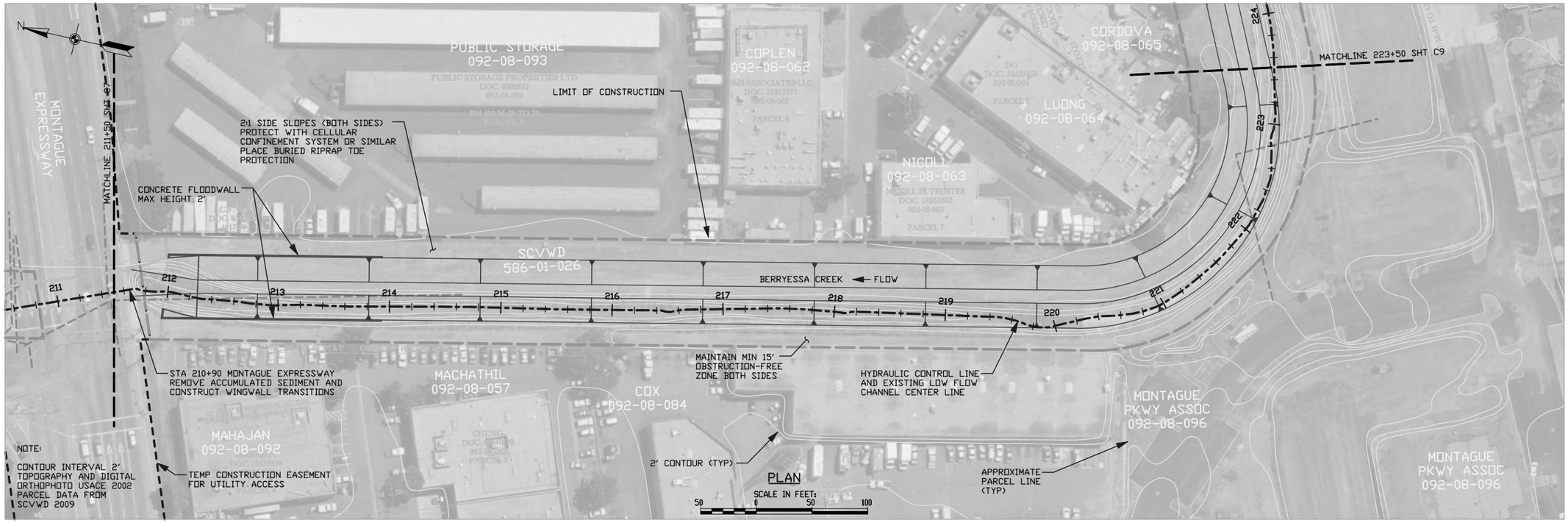

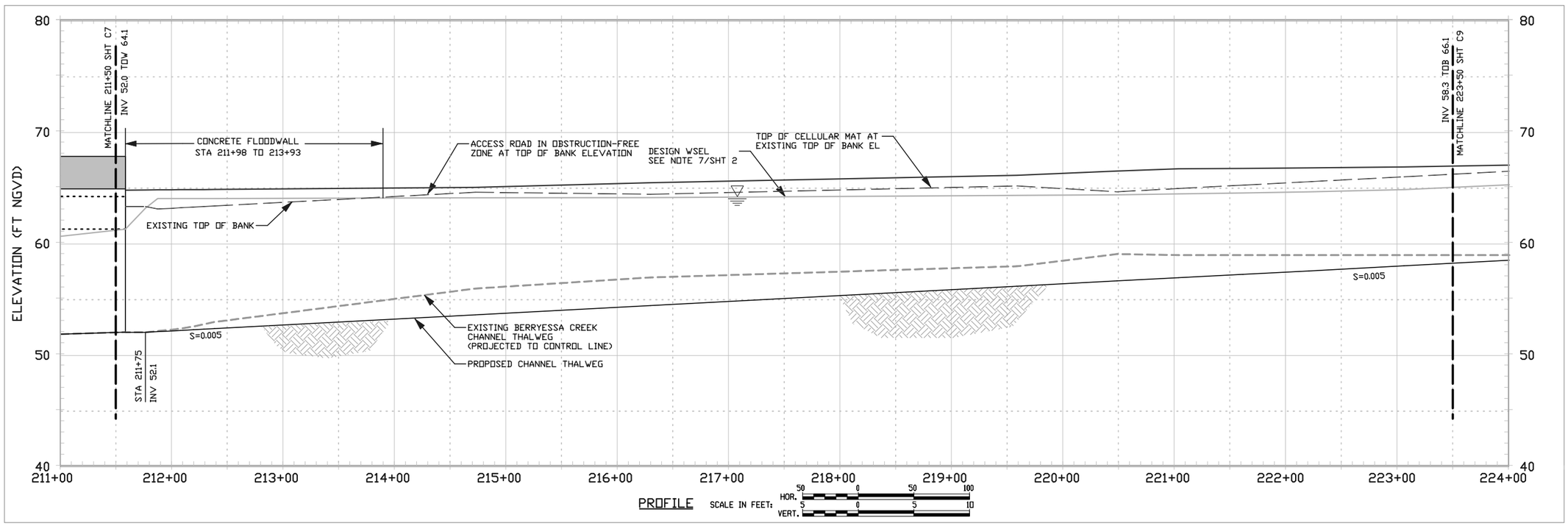

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US Army Corps of Engineers
Sacramento District

Symbol	Description	Date Approved

Date: JAN 17, 2012 | Rev. N/A
Spec No.: N/A | Design file no: N/A
Drawing Code:
File name: BER PP C-XX
Prior date: DEC 22, 2011
Prior scale: 50/100

Designed by: PRELIMINARY
Dwn by: KP
Reviewed by: RM
Submitted by:
CHIEF, CIV ENGR DES SEC A

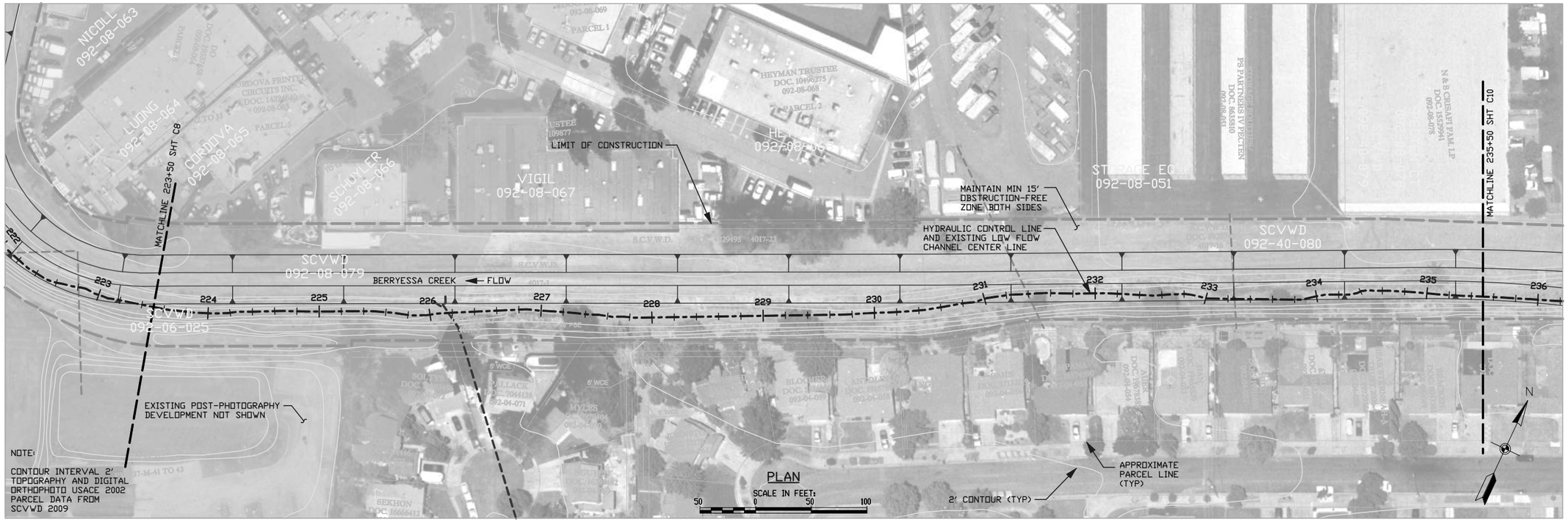
U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
IN PARTNERSHIP WITH:
SANTA CLARA VLY WATER DISTRICT

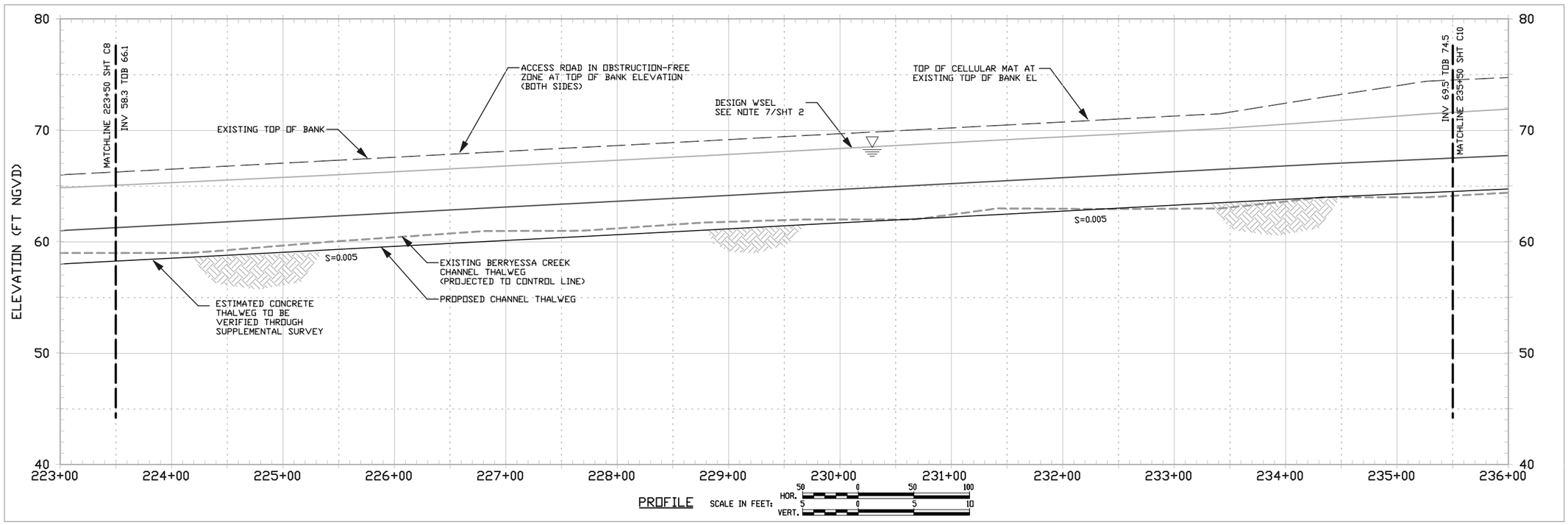
PREPARED BY:
TETRA TECH, INC.
17770 CARTWRIGHT, STE. 500
IRVINE, CA 92614

SANTA CLARA COUNTY
CALIFORNIA
BERRYESSA CREEK PROJECT
GENERAL REEVALUATION STUDY
ALTERNATIVES FORMULATION

ALTERNATIVE 2A/d
PLAN AND PROFILE VIEW
STA. 211+00 TO 224+00

Sheet reference number:
C8
Sheet 13 of 35





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CHIEF, CIV ENGR DES SEC A

U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
IN PARTNERSHIP WITH:
SANTA CLARA VLY WATER DISTRICT

PREPARED BY:
TETRA TECH, INC.
17770 CARTWRIGHT, STE. 500
IRVINE, CA 92614

SANTA CLARA COUNTY
CALIFORNIA
BERRYESSA CREEK PROJECT
GENERAL REEVALUATION STUDY
ALTERNATIVES FORMULATION

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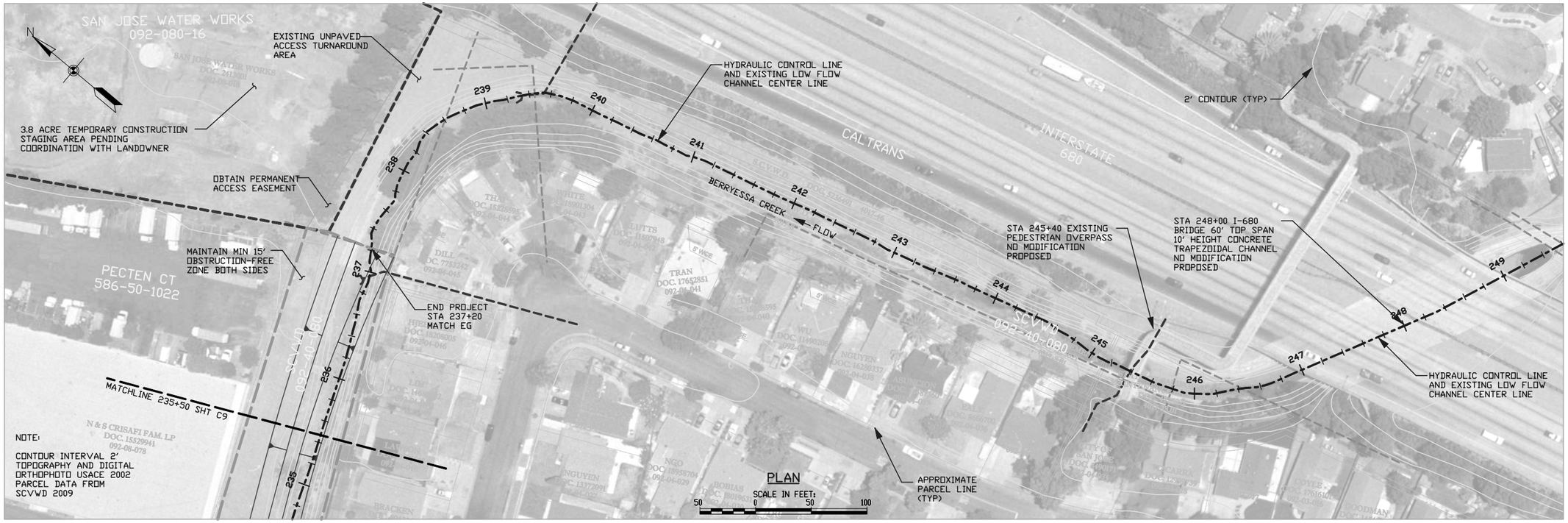
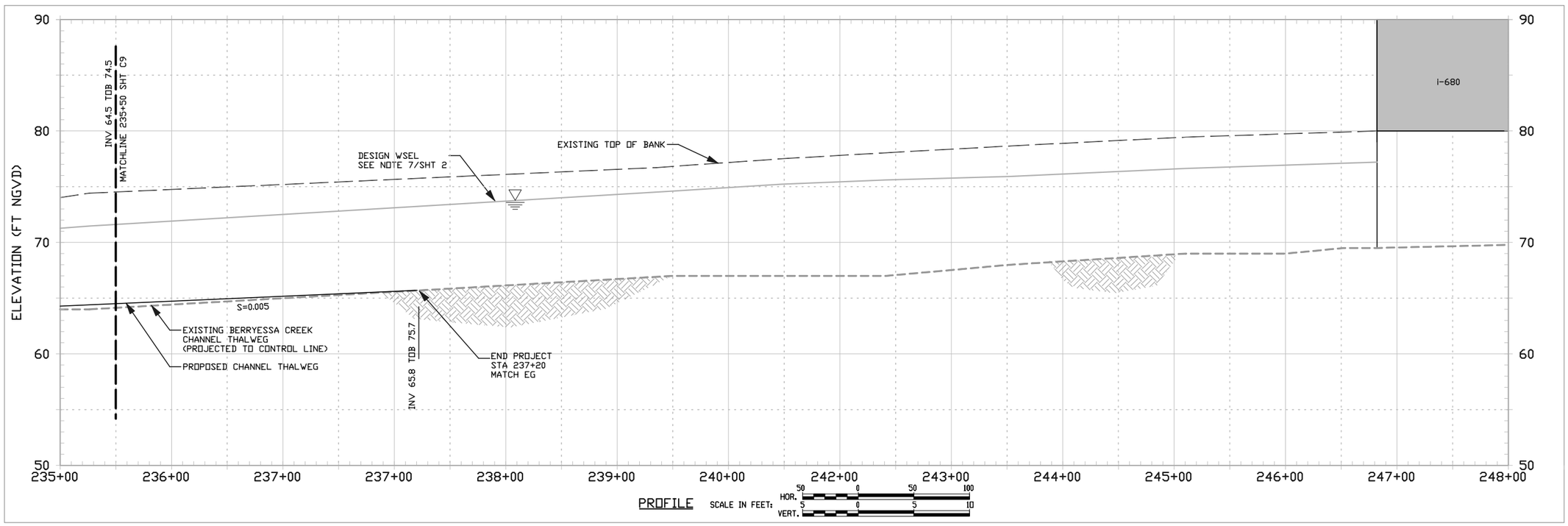
PLAN AND PROFILE VIEW
STA. 220+00 TO 233+00

Sheet reference number:
C9
Sheet 14 of 35





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Submitted by:
CHIEF, CIV ENGR DES SEC A

U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
IN PARTNERSHIP WITH:
SANTA CLARA VLY WATER DISTRICT

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TETRA TECH, INC.
17770 CARTWRIGHT, STE. 500
IRVINE, CA 92614

SANTA CLARA COUNTY
CALIFORNIA
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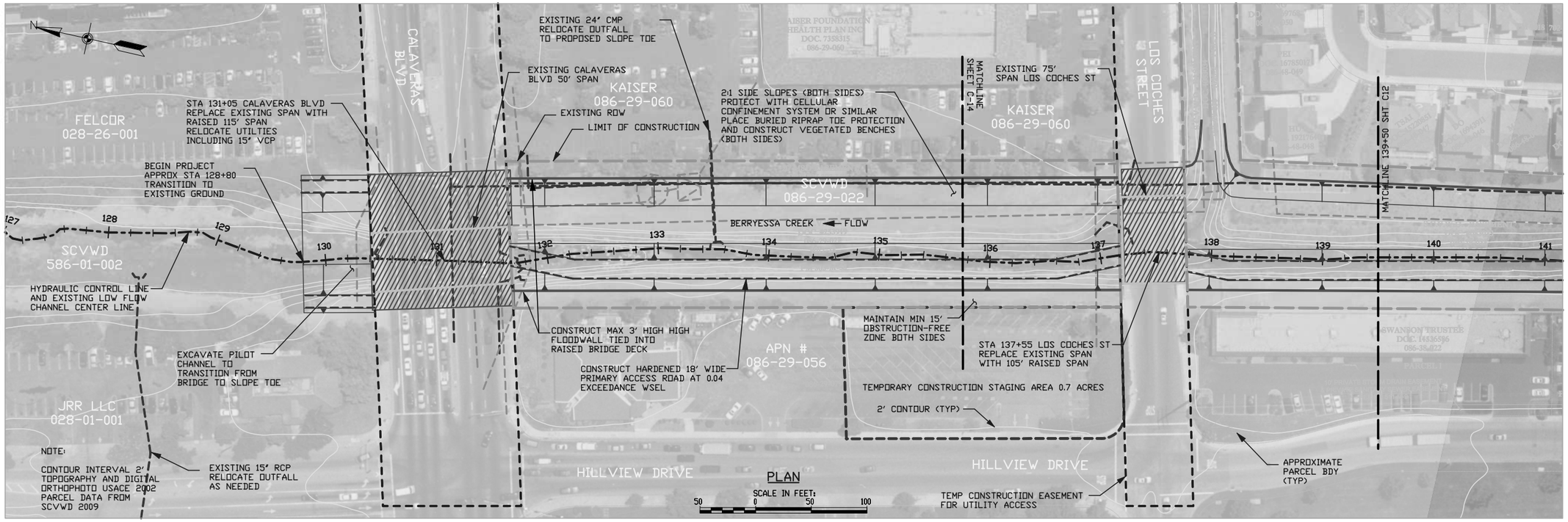
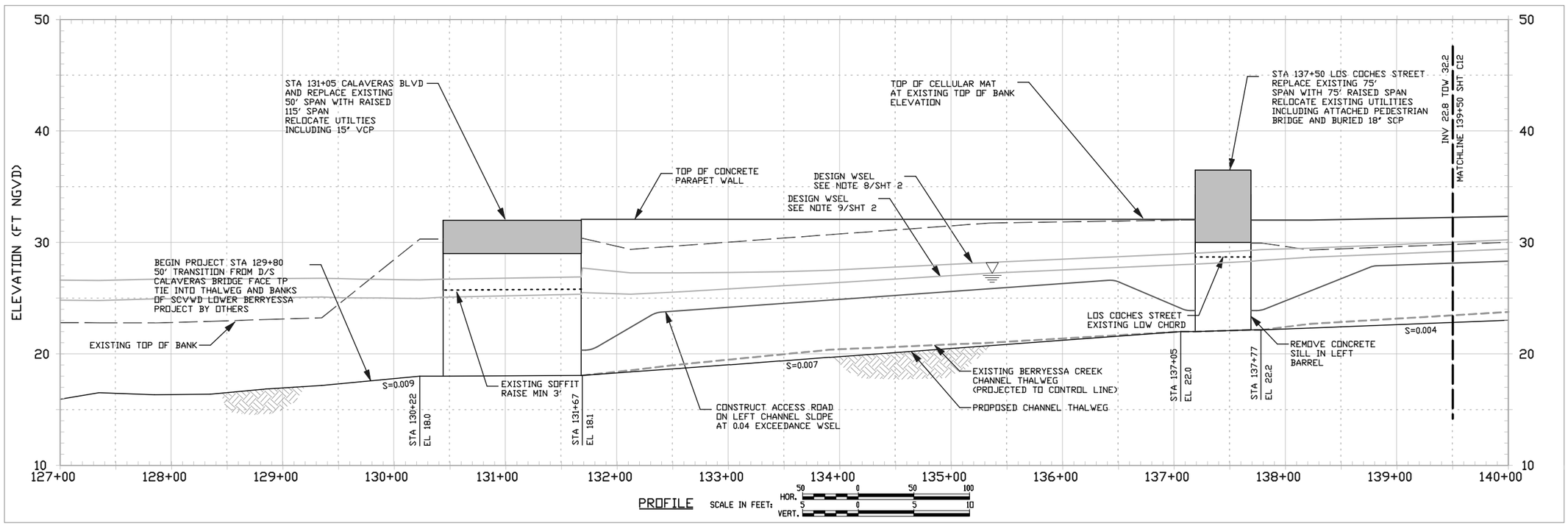
ALTERNATIVES FORMULATION

ALTERNATIVE 2A/d
PLAN AND PROFILE VIEW
STA. 235+00 TO 248+00

Sheet reference number:
C10
Sheet 15 of 35





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Reviewed by: RM
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U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
IN PARTNERSHIP WITH:
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TETRA TECH, INC.
17770 CARTWRIGHT, STE. 500
IRVINE, CA 92614

SANTA CLARA COUNTY
CALIFORNIA
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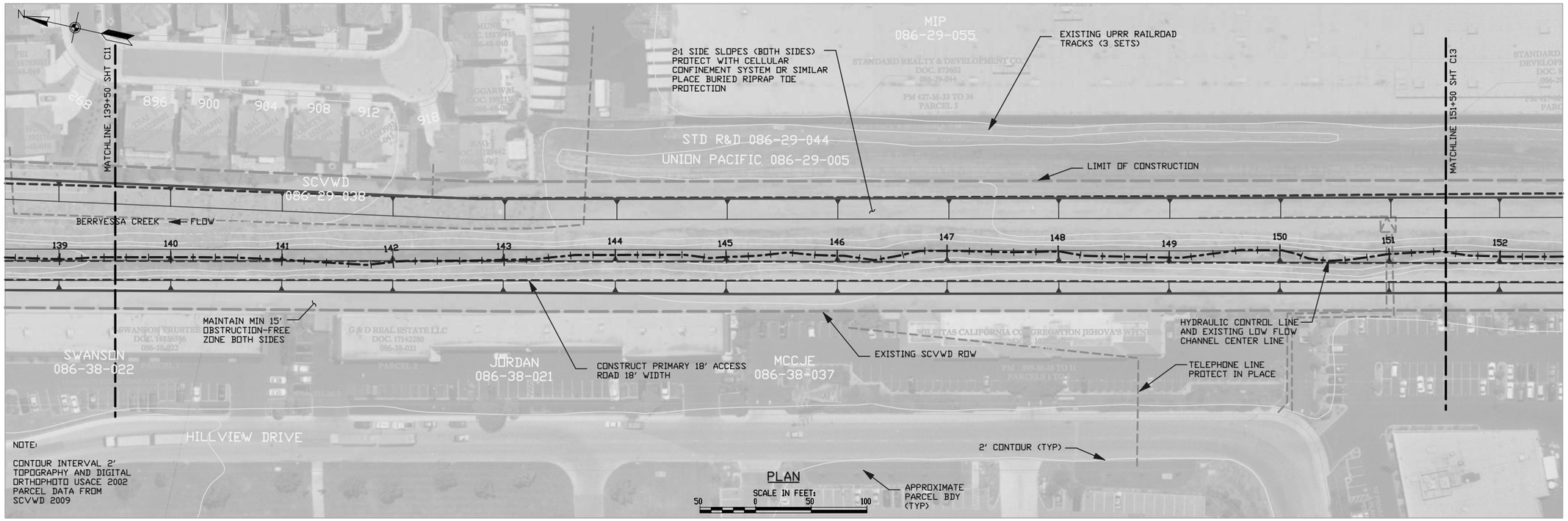
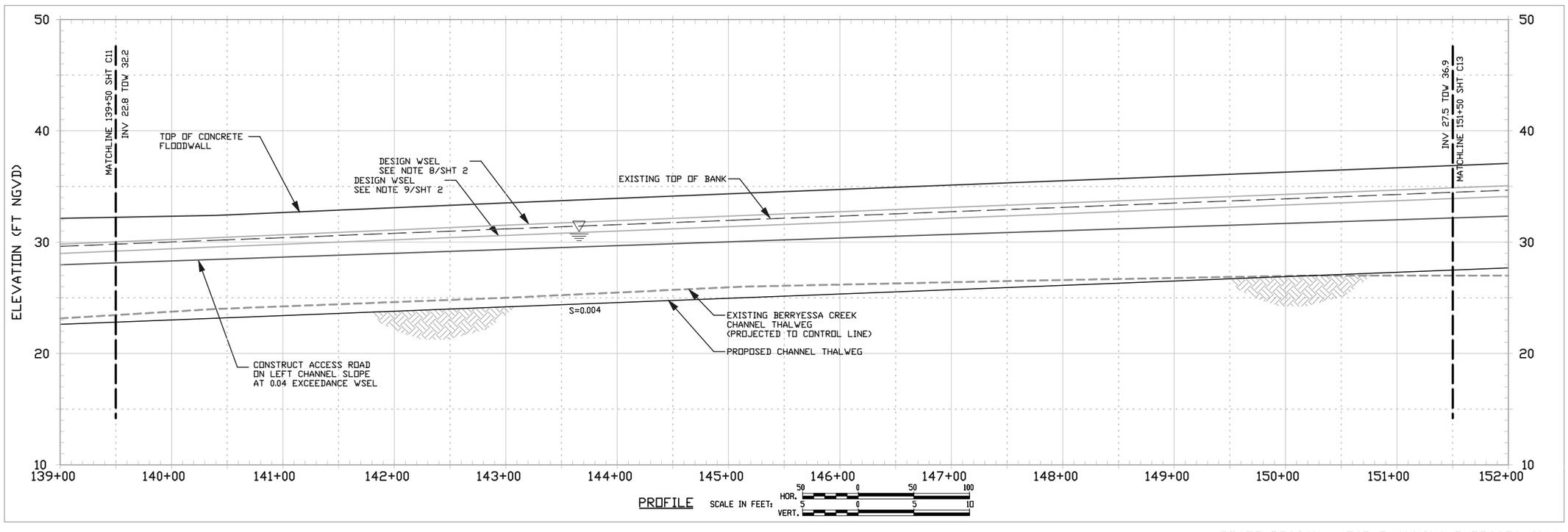
ALTERNATIVES FORMULATION

ALTERNATIVE 2B/d
PLAN AND PROFILE VIEW
STA. 127+00 TO 140+00

Sheet reference number:
C11
Sheet 16 of 35





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U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
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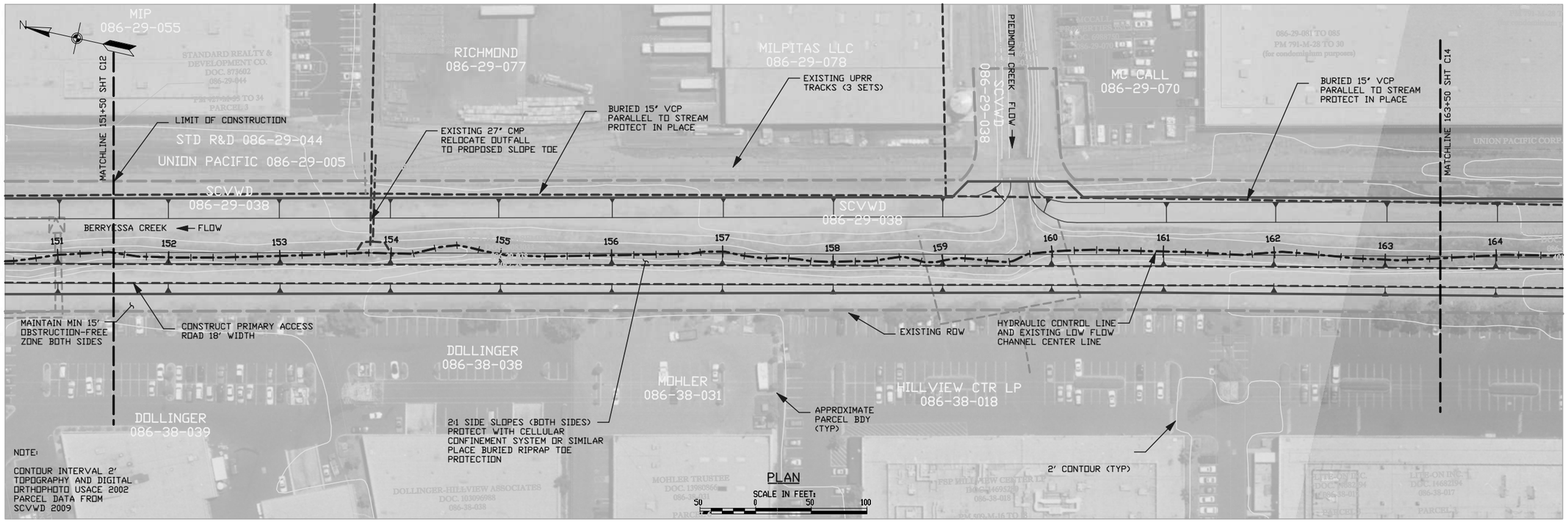
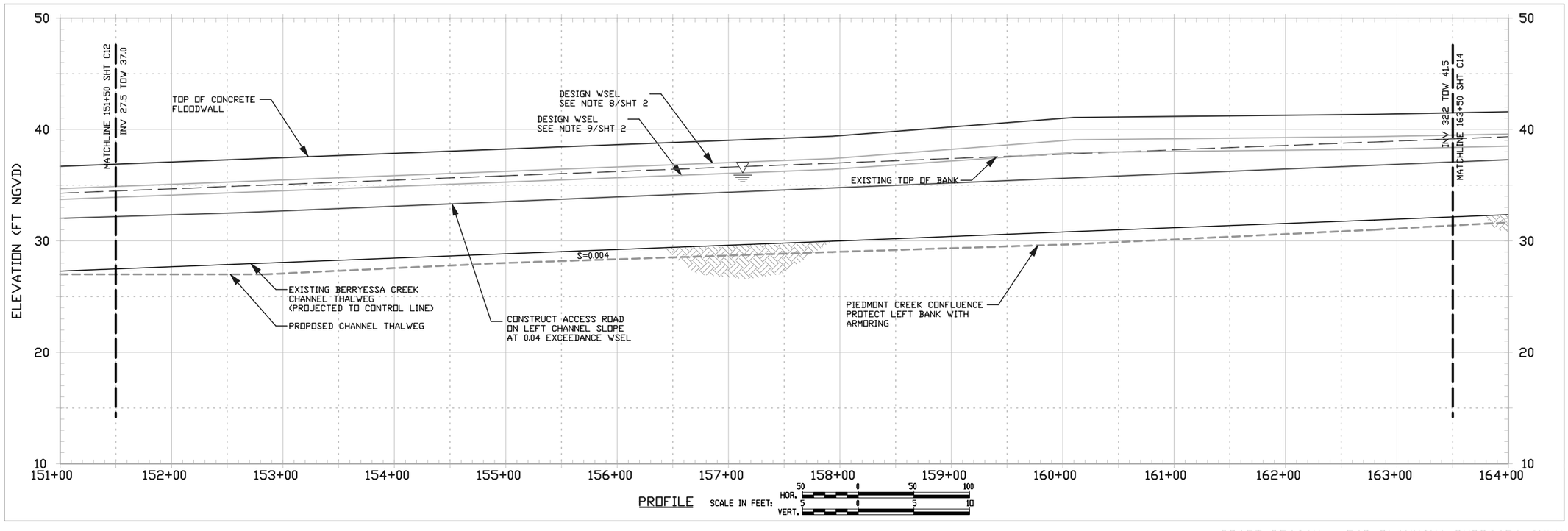
Sheet reference number:
C12
Sheet 17 of 35





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U.S. ARMY CORPS OF ENGINEERS
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SANTA CLARA COUNTY
CALIFORNIA
BERRYESSA CREEK PROJECT
GENERAL REEVALUATION STUDY
ALTERNATIVES FORMULATION

ALTERNATIVE 2B/d
PLAN AND PROFILE VIEW
STA. 151+00 TO 164+00

Sheet reference number:
C13
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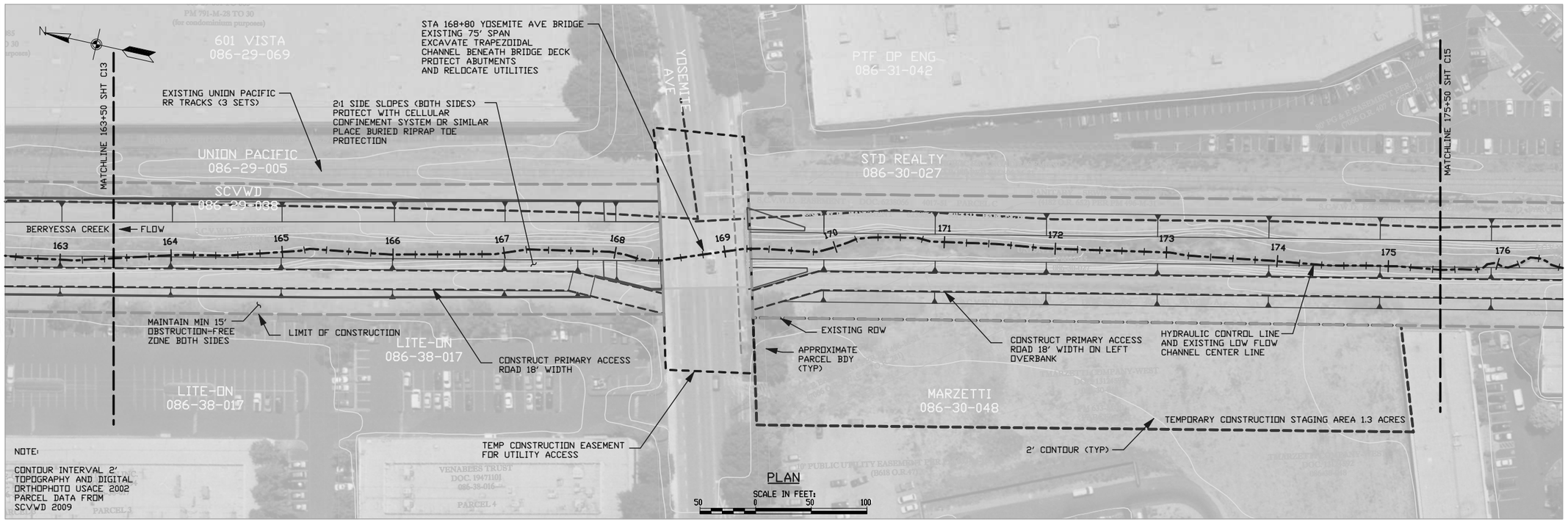

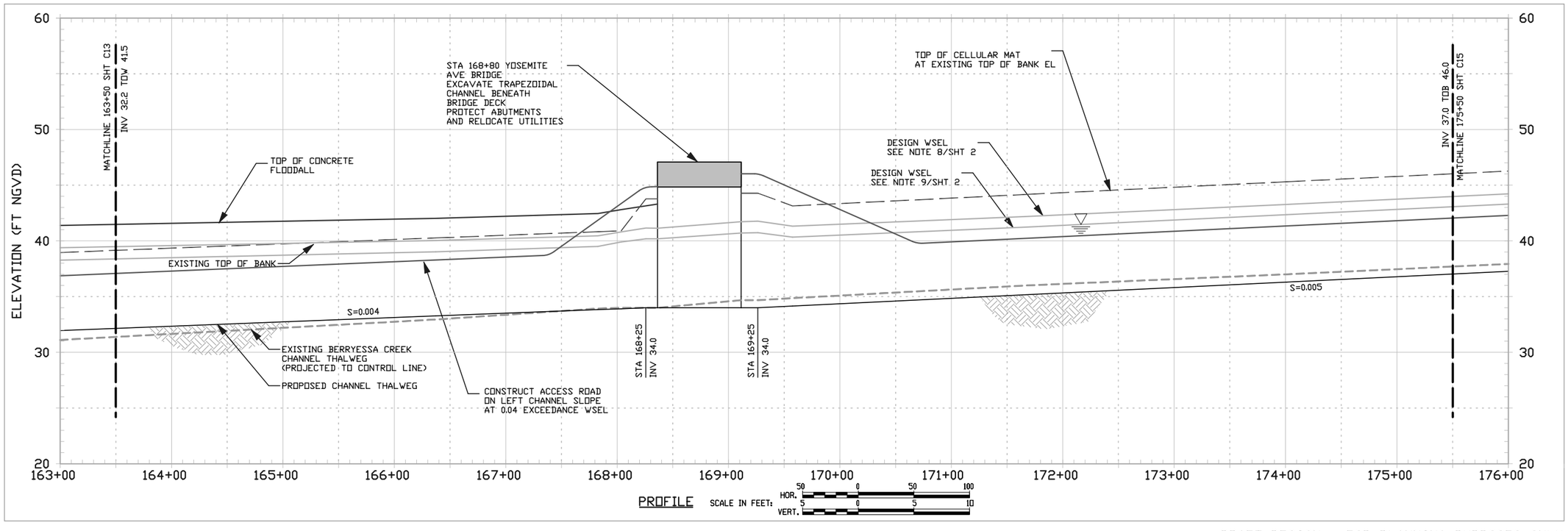

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US Army Corps of Engineers
Sacramento District

Symbol	Description	Date Approved

Date: JAN 17, 2012 Rev. N/A
Designed by: PRELIMINARY
Drawn by: KP
Reviewed by: RM
Submitted by: Chief, CIV ENGR DES SEC A
Spec No.: N/A
Design file no: N/A
Drawing Code:
File name: BER PP C-XX
Prior date: DEC 22, 2011
Prior scale: 50/100

U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
IN PARTNERSHIP WITH:
SANTA CLARA VLY WATER DISTRICT

PREPARED BY:
TETRA TECH, INC.
17770 CARTWRIGHT, STE. 500
IRVINE, CA 92614

SANTA CLARA COUNTY CALIFORNIA
BERRYESSA CREEK PROJECT
GENERAL REEVALUATION STUDY
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PLAN AND PROFILE VIEW
STA. 163+00 TO 176+00

Sheet reference number:
C14
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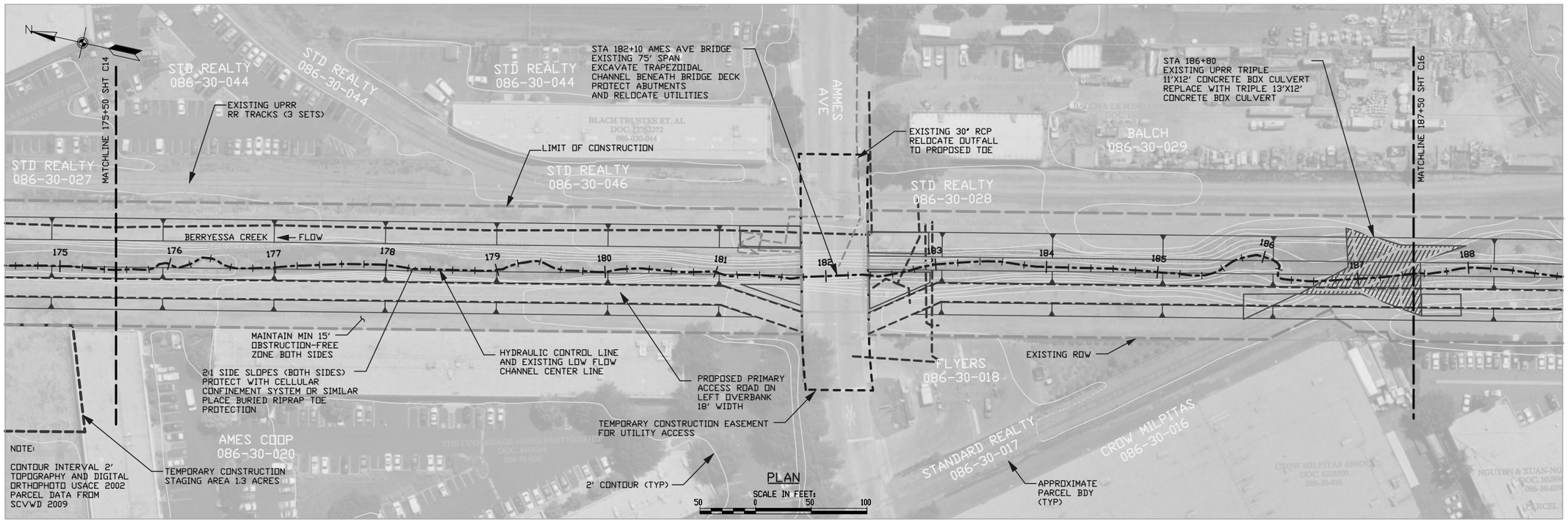

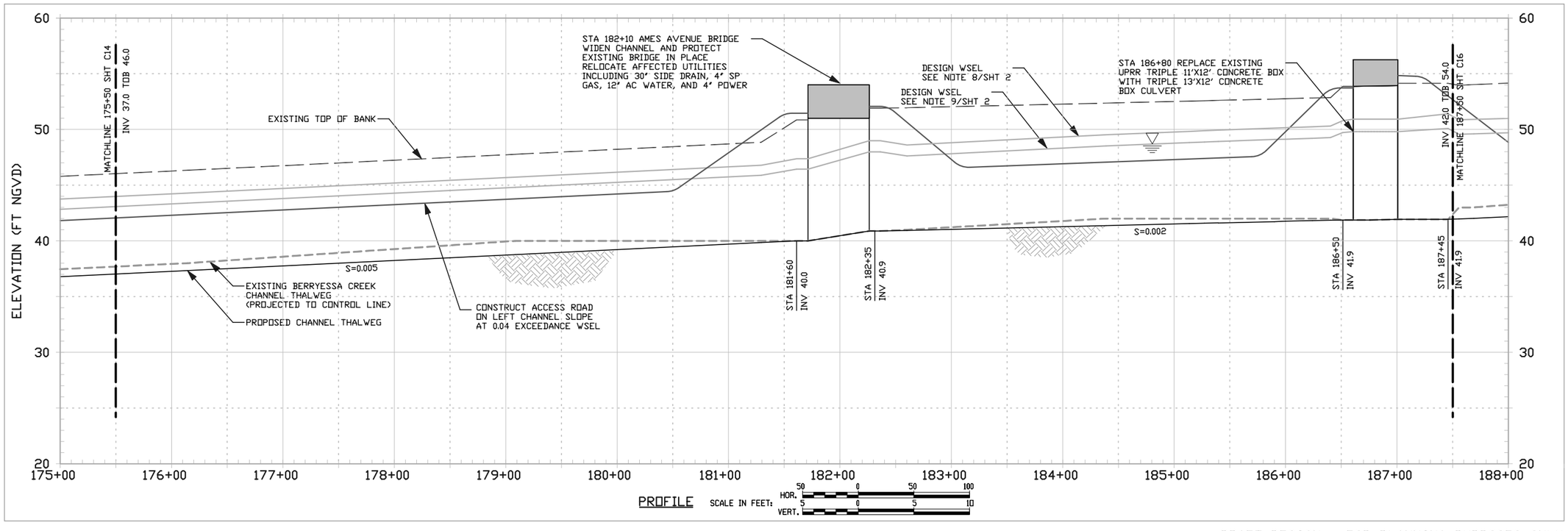

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PLAN AND PROFILE VIEW
STA. 175+00 TO 188+00

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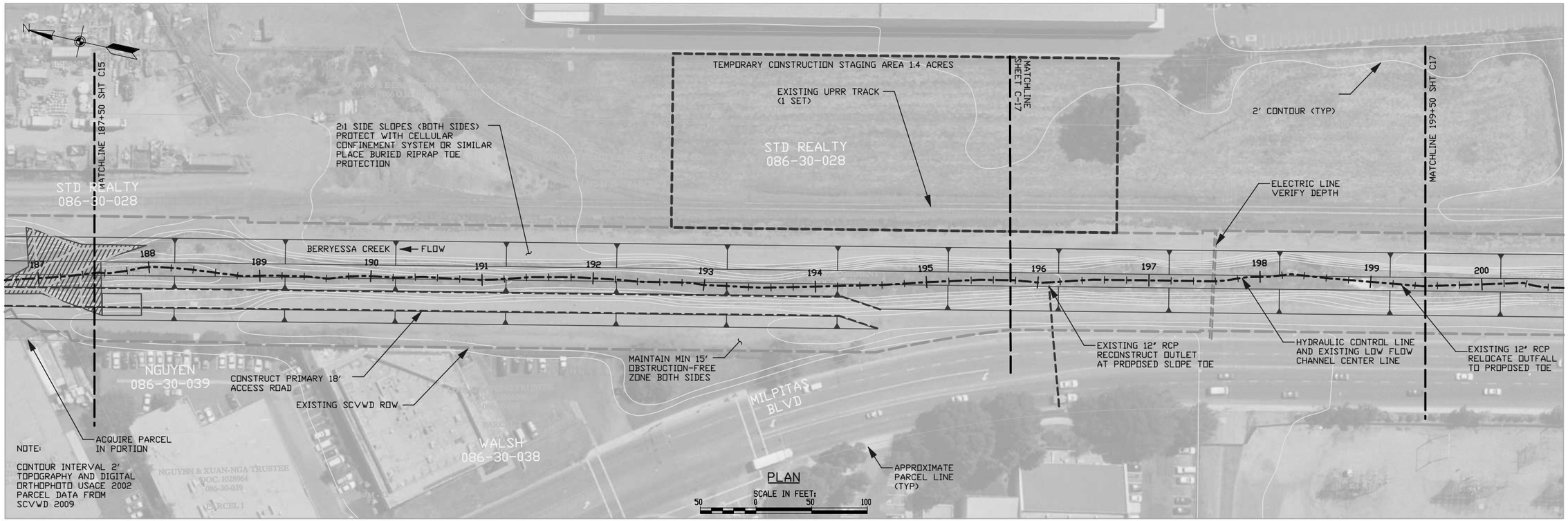

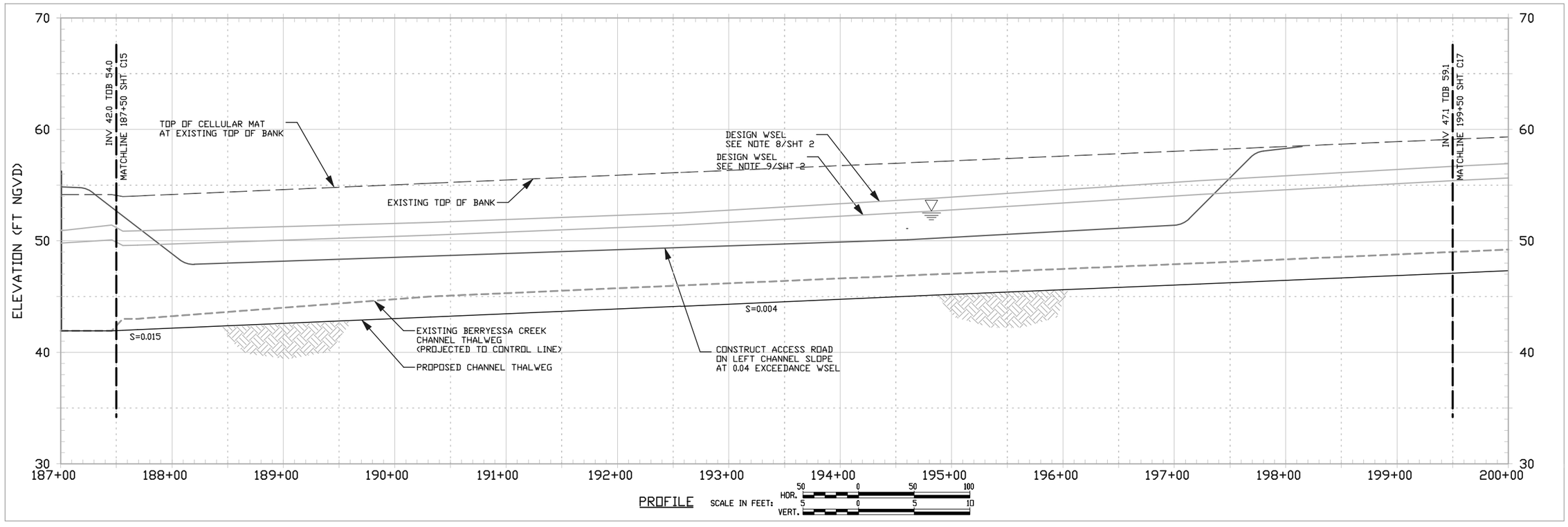

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Sacramento District

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U.S. ARMY CORPS OF ENGINEERS
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STA. 187+00 TO 200+00

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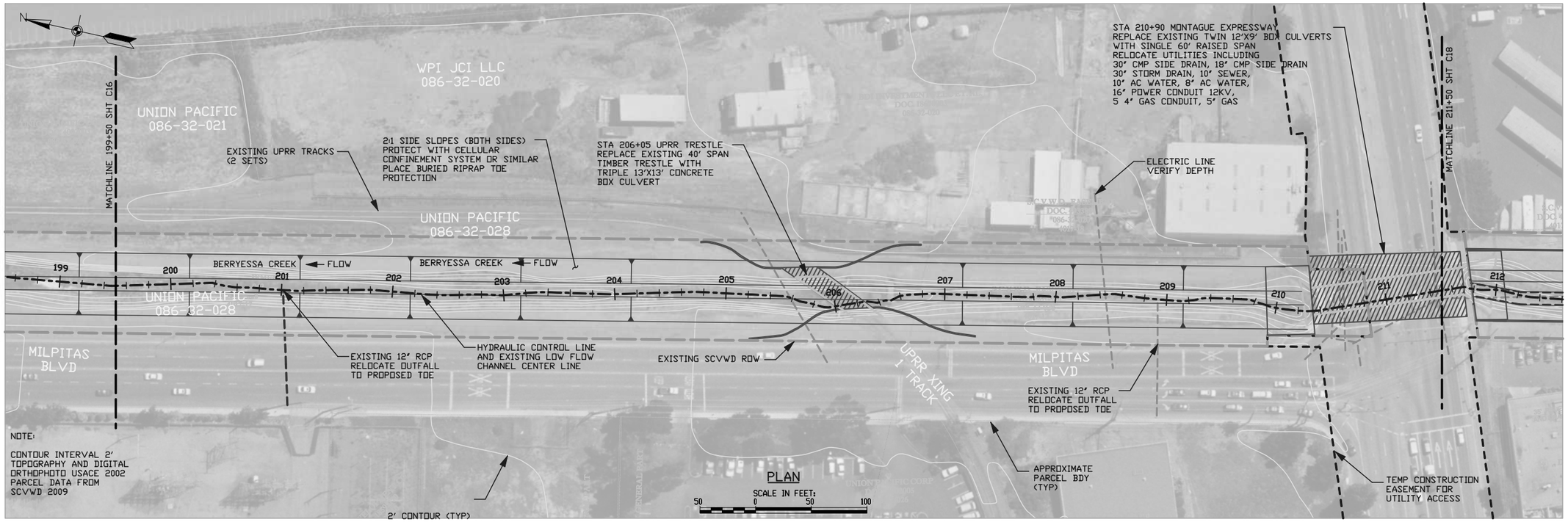

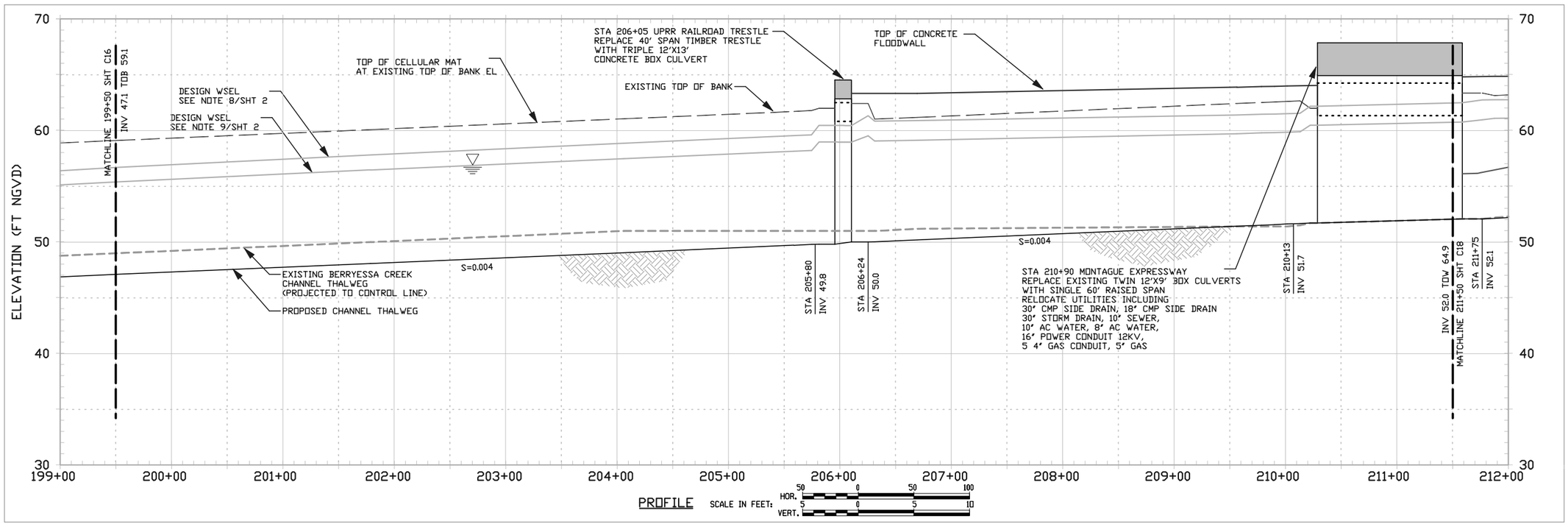

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U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
IN PARTNERSHIP WITH:
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STA. 199+00 TO 212+00

Sheet reference number:
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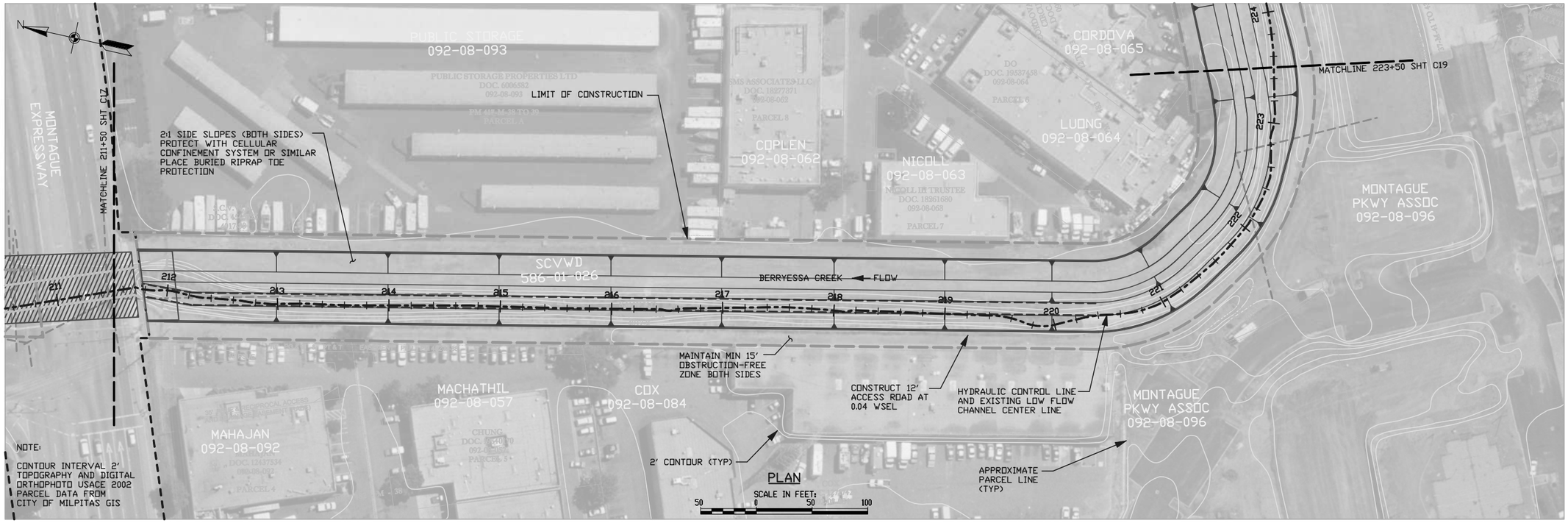

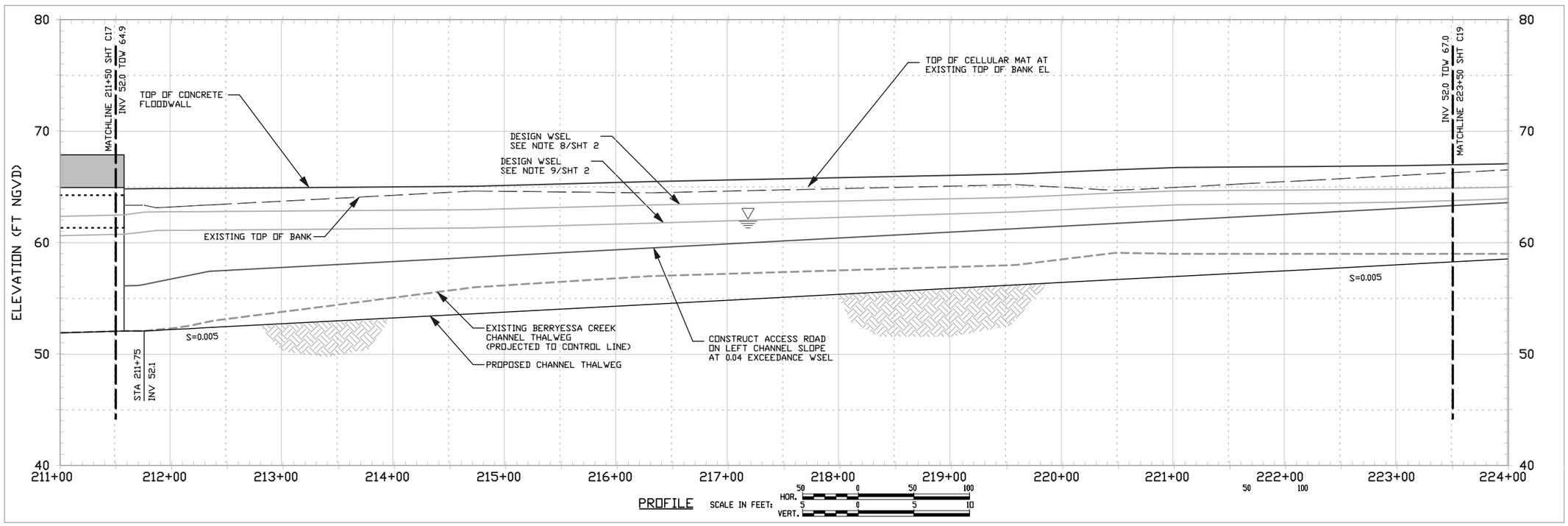

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U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
IN PARTNERSHIP WITH:
SANTA CLARA VLY WATER DISTRICT

PREPARED BY:
TETRA TECH, INC.
17770 CARTWRIGHT, STE. 500
IRVINE, CA 92614

SANTA CLARA COUNTY
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ALTERNATIVES FORMULATION

ALTERNATIVE 2B/d
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STA. 211+00 TO 224+00

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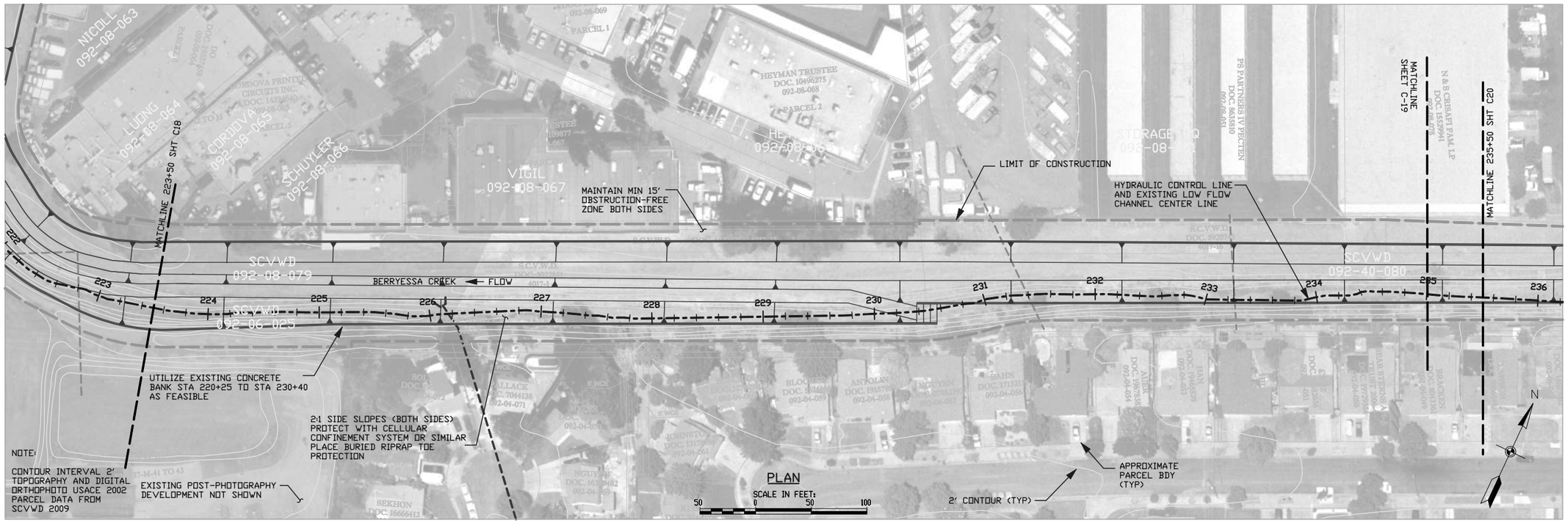

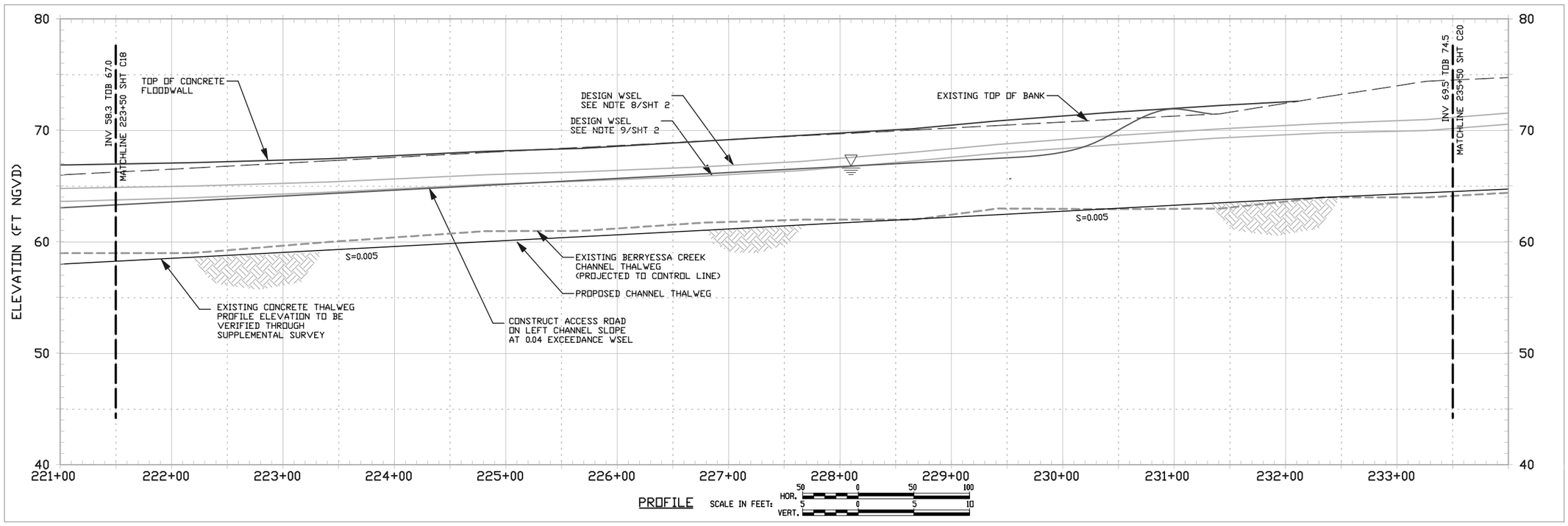

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U.S. ARMY CORPS OF ENGINEERS
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IN PARTNERSHIP WITH:
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PREPARED BY:
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17770 CARTWRIGHT, STE. 500
IRVINE, CA 92614

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ALTERNATIVES FORMULATION

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PLAN AND PROFILE VIEW
STA. 223+00 TO 236+00

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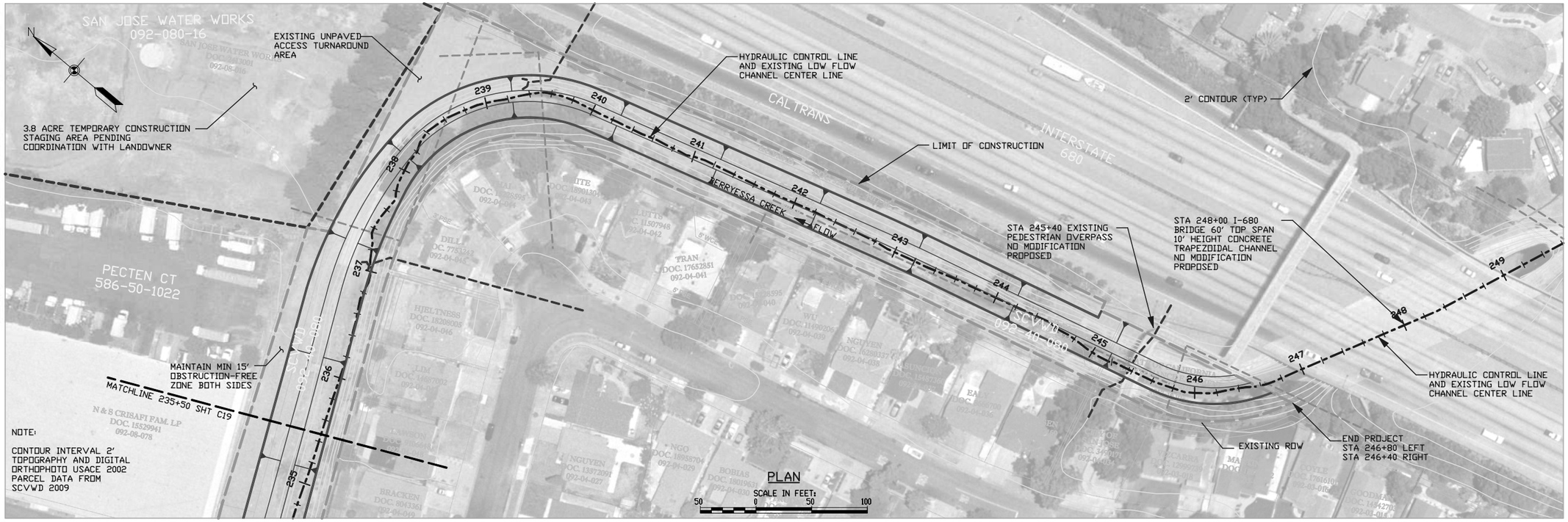

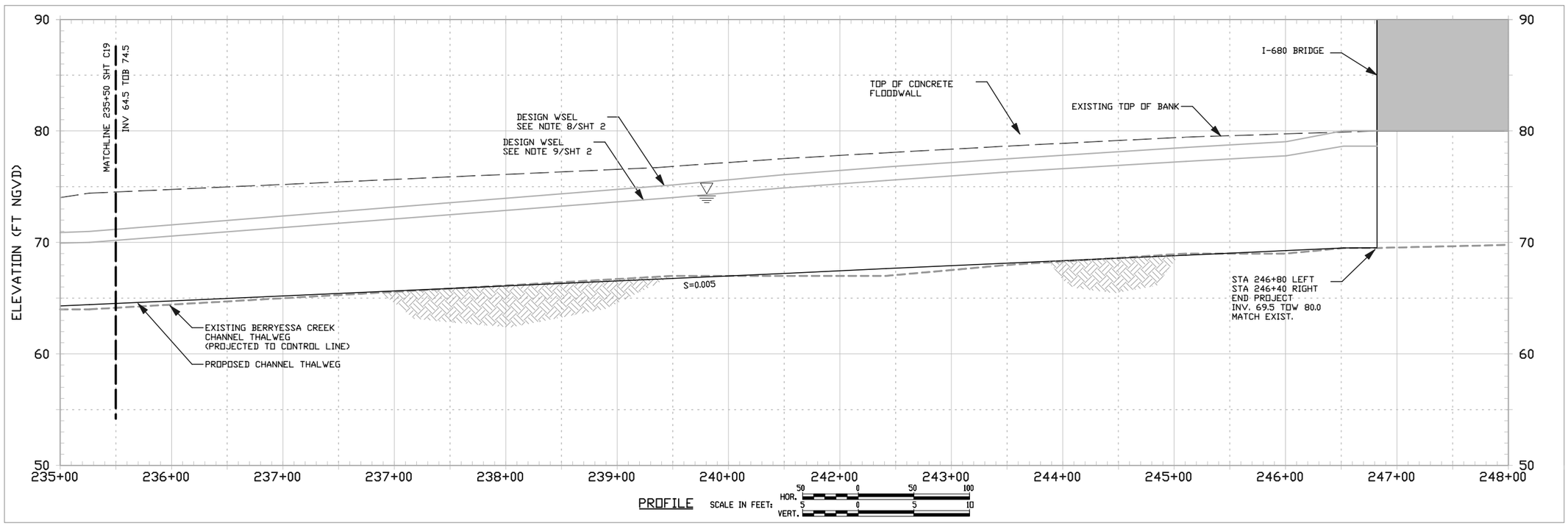

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U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
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SANTA CLARA VLY WATER DISTRICT

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TETRA TECH, INC.
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ALTERNATIVES FORMULATION

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PLAN AND PROFILE VIEW
STA. 232+00 TO 245+00

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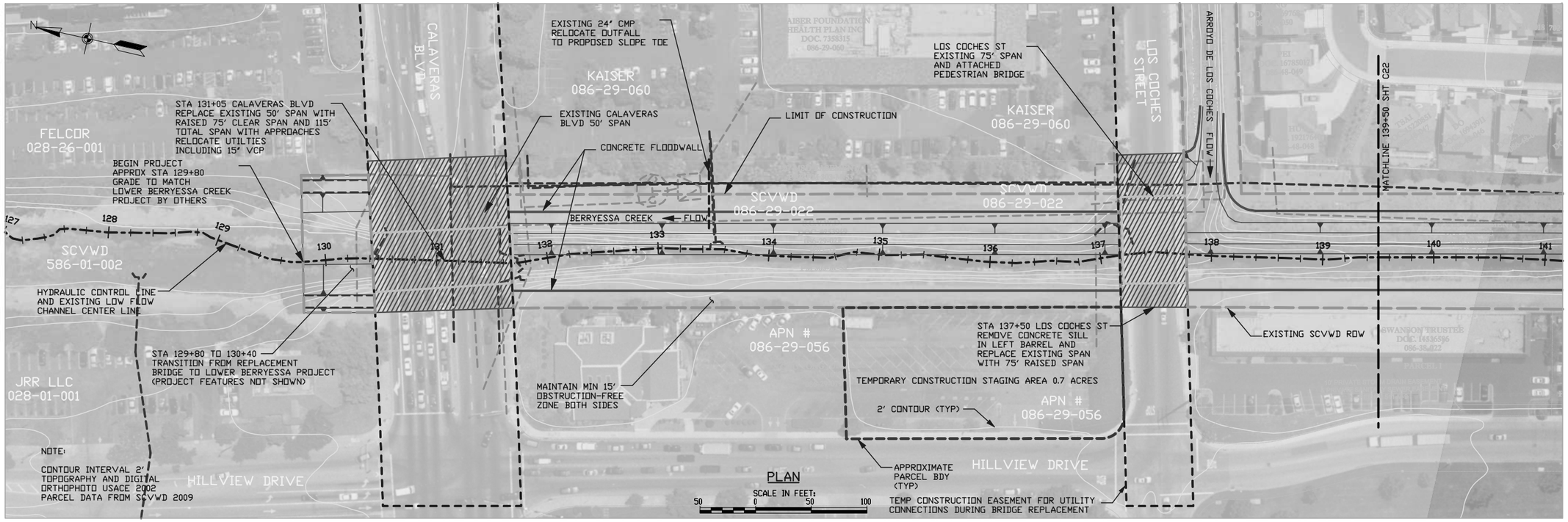

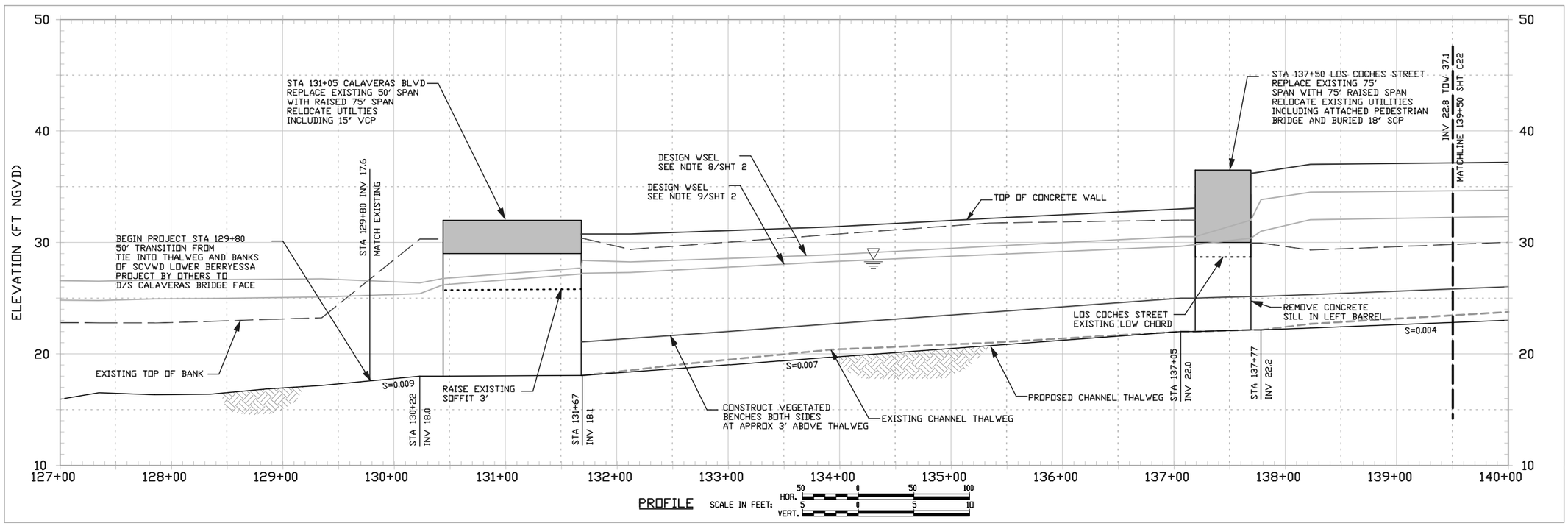

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Sacramento District

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U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
IN PARTNERSHIP WITH:
SANTA CLARA VLY WATER DISTRICT

PREPARED BY:
TETRA TECH, INC.
17770 CARTWRIGHT, STE. 500
IRVINE, CA 92614

SANTA CLARA COUNTY
CALIFORNIA
BERRYESSA CREEK PROJECT
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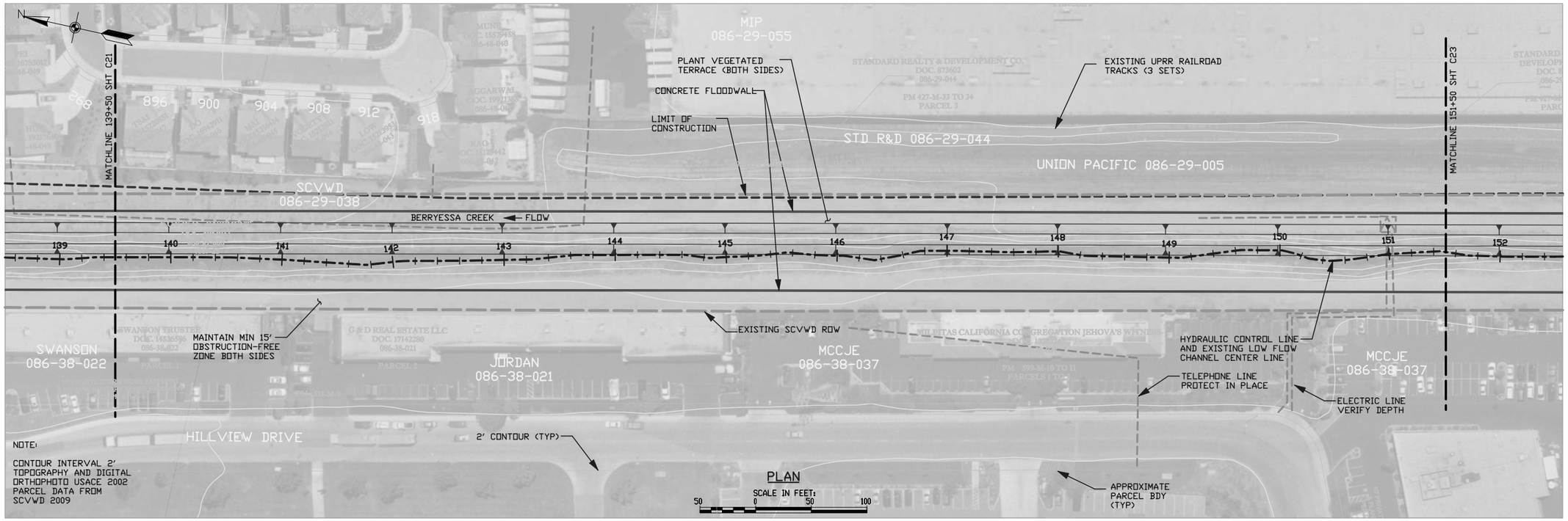
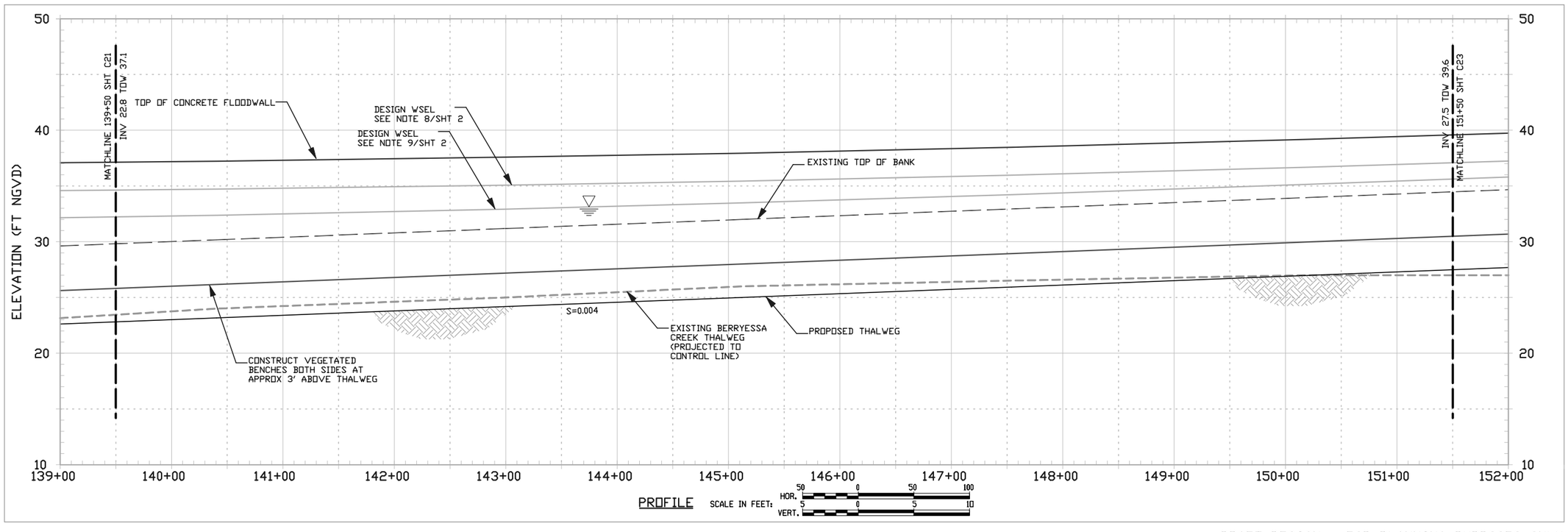
ALTERNATIVES FORMULATION

ALTERNATIVE 4B/d
PLAN AND PROFILE VIEW
STA. 127+00 TO 140+00

Sheet reference number:
C21
Sheet 26 of 35





US Army Corps of Engineers
Sacramento District

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CHIEF, CIV ENGR DES SEC A

U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
IN PARTNERSHIP WITH:
SANTA CLARA VLY WATER DISTRICT

PREPARED BY:
TETRA TECH, INC.
17770 CARTWRIGHT, STE. 500
IRVINE, CA 92614

SANTA CLARA COUNTY
CALIFORNIA
BERRYESSA CREEK PROJECT
GENERAL REEVALUATION STUDY
ALTERNATIVES FORMULATION

ALTERNATIVE 4B/d
PLAN AND PROFILE VIEW
STA. 139+00 TO 151+00

Sheet reference number:
C22
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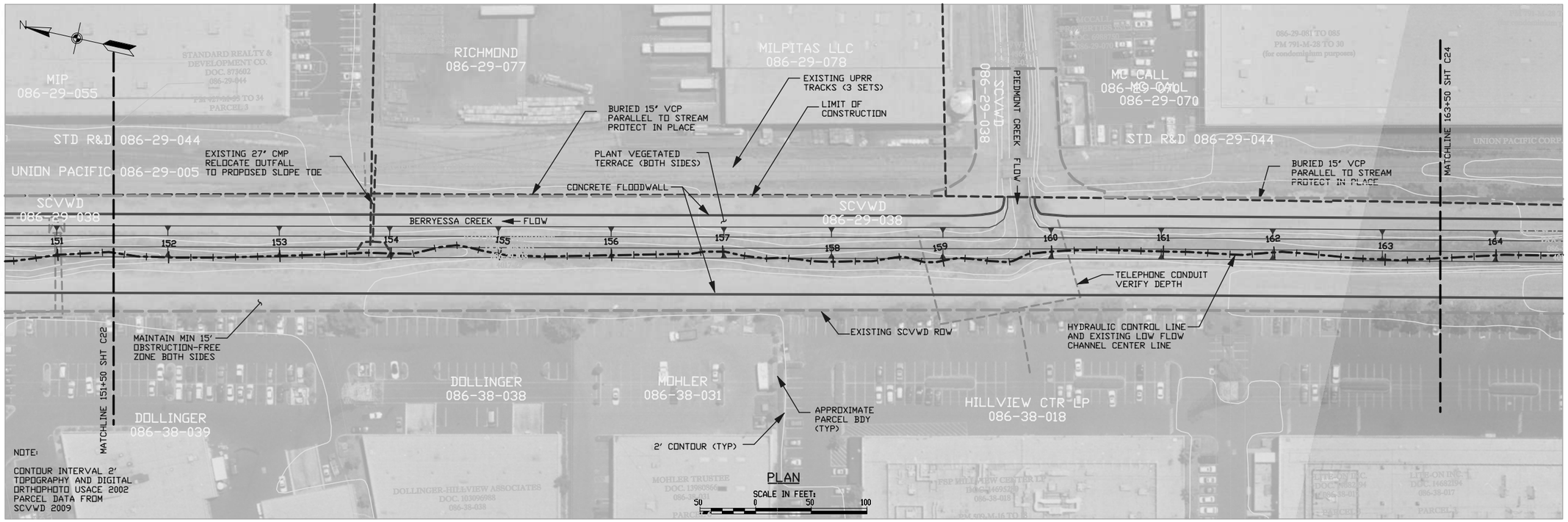

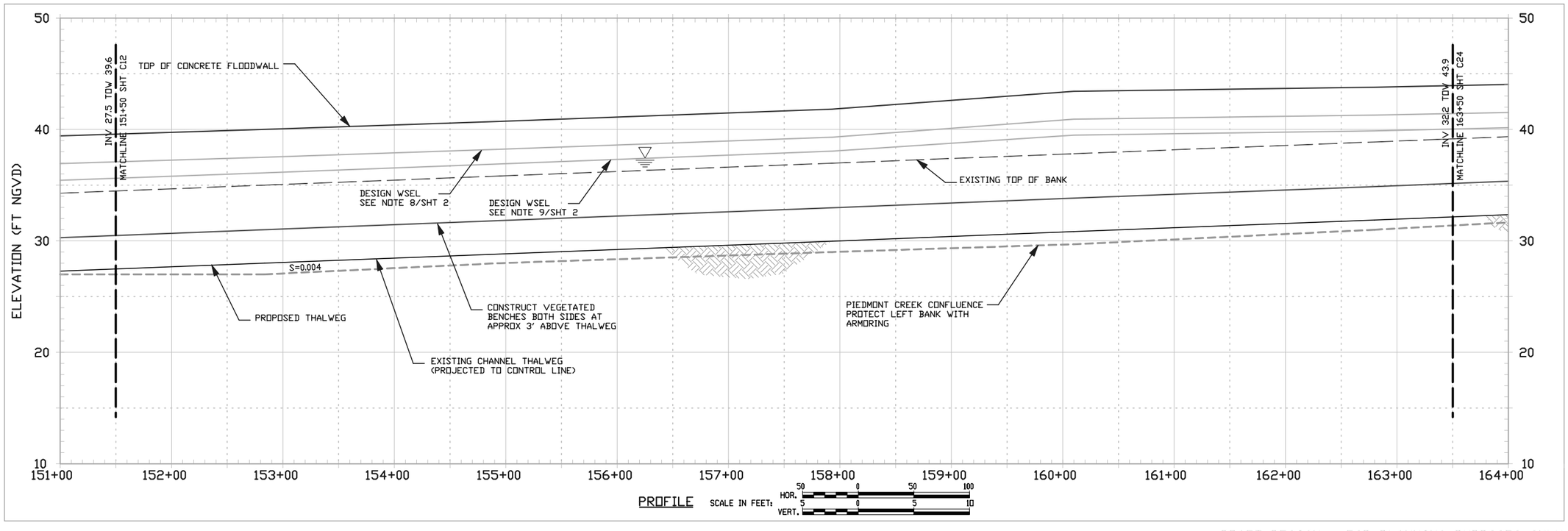

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U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
IN PARTNERSHIP WITH:
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SANTA CLARA COUNTY CALIFORNIA
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ALTERNATIVES FORMULATION

ALTERNATIVE 4B/d
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Sheet reference number:
C23
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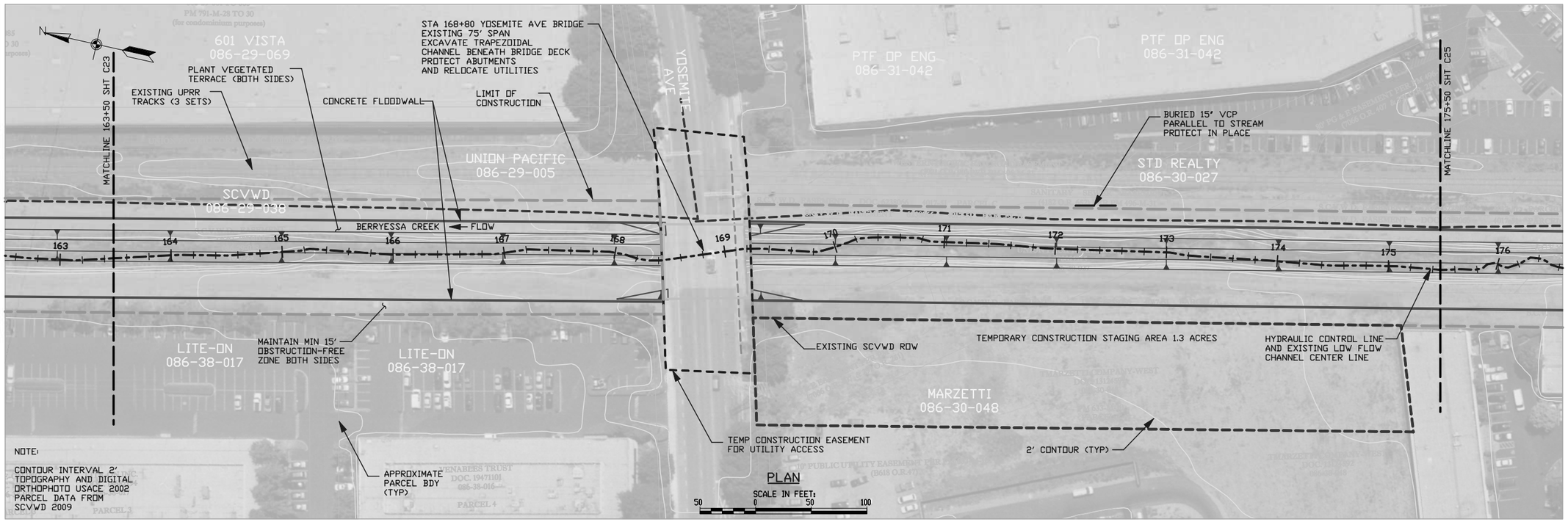

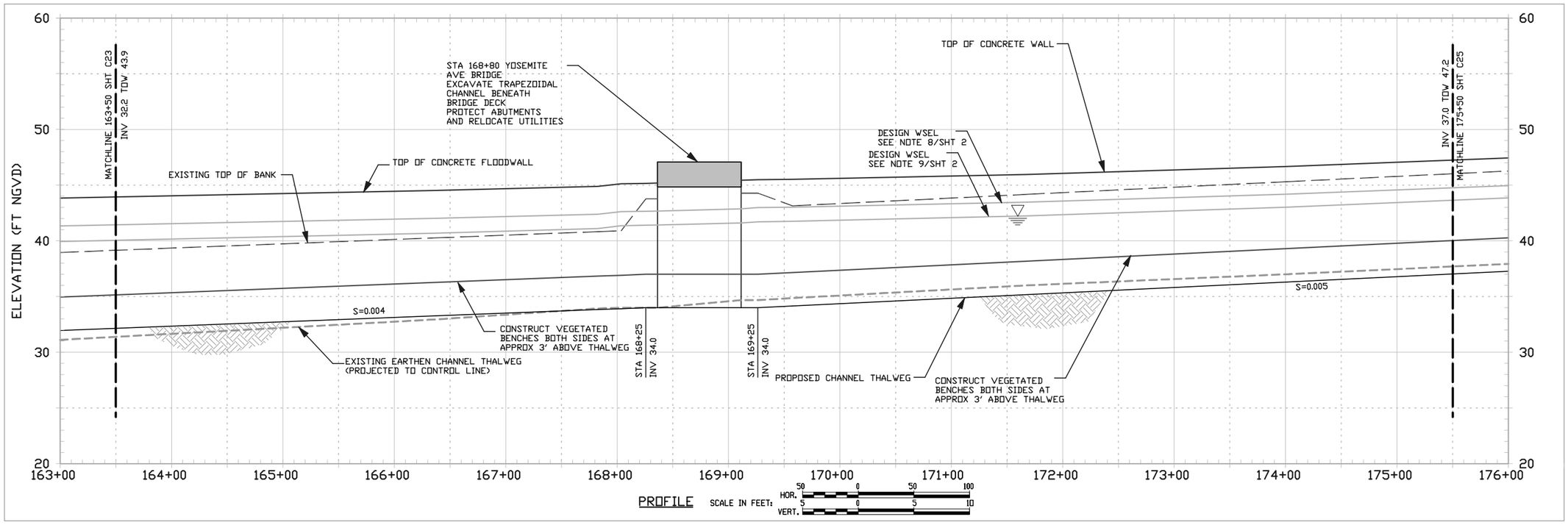

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SACRAMENTO DISTRICT
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ALTERNATIVES FORMULATION

ALTERNATIVE 4B/d
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STA. 163+00 TO 176+00

Sheet reference number:
C24
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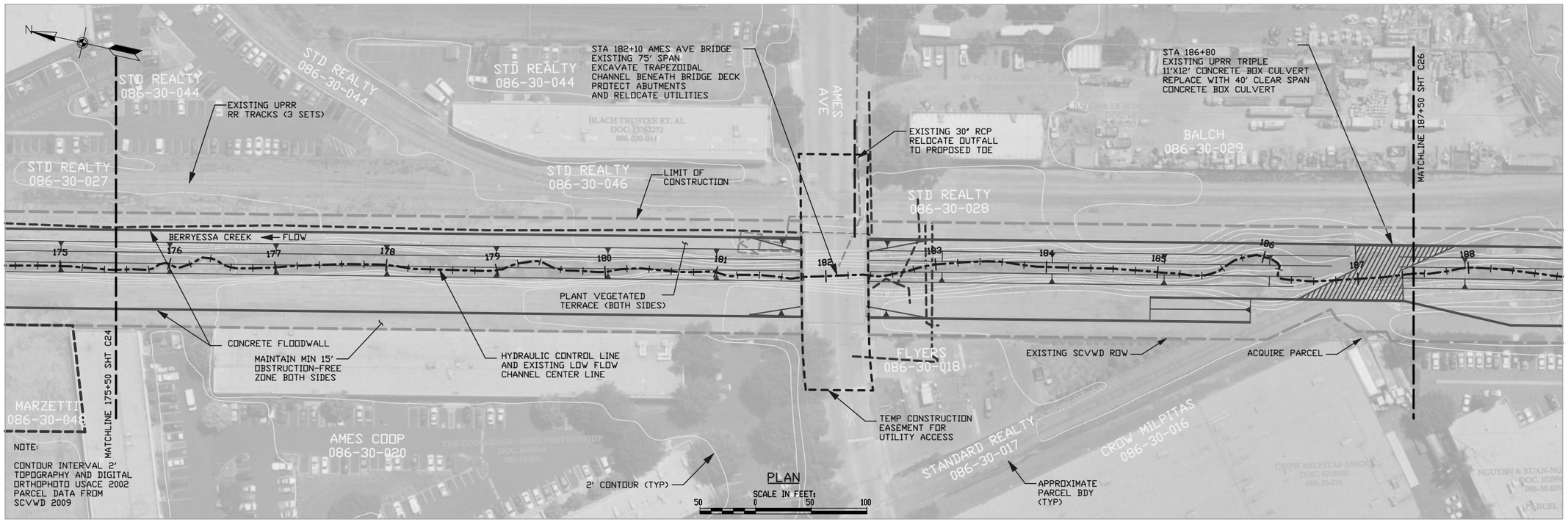

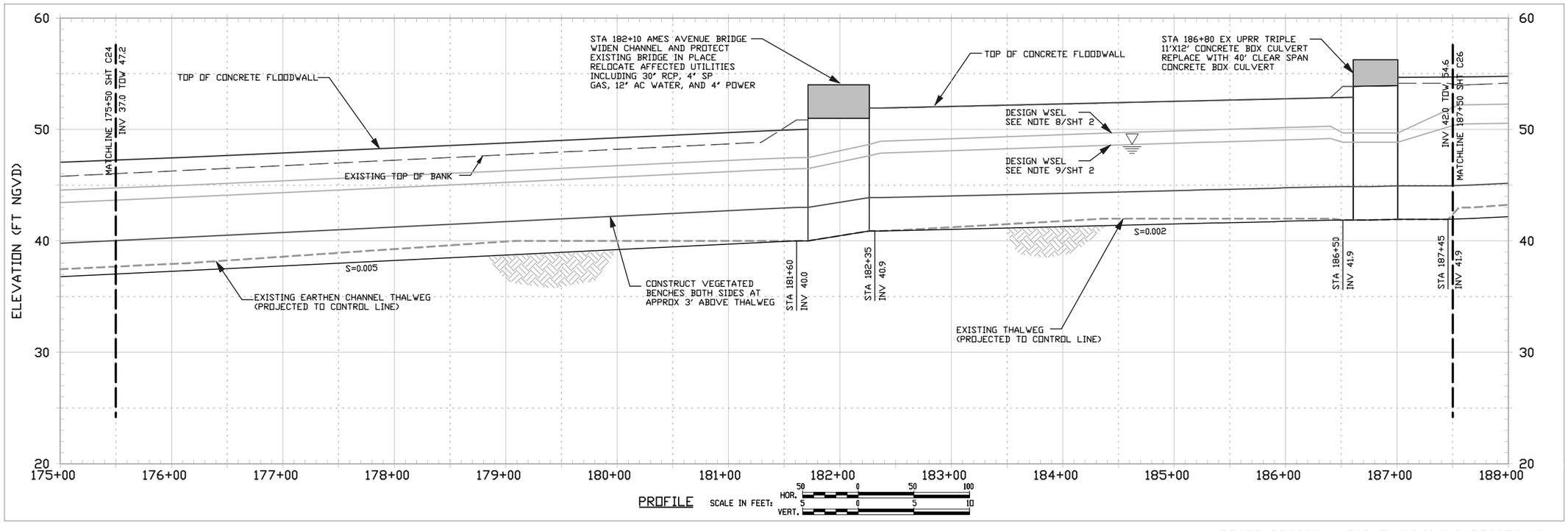

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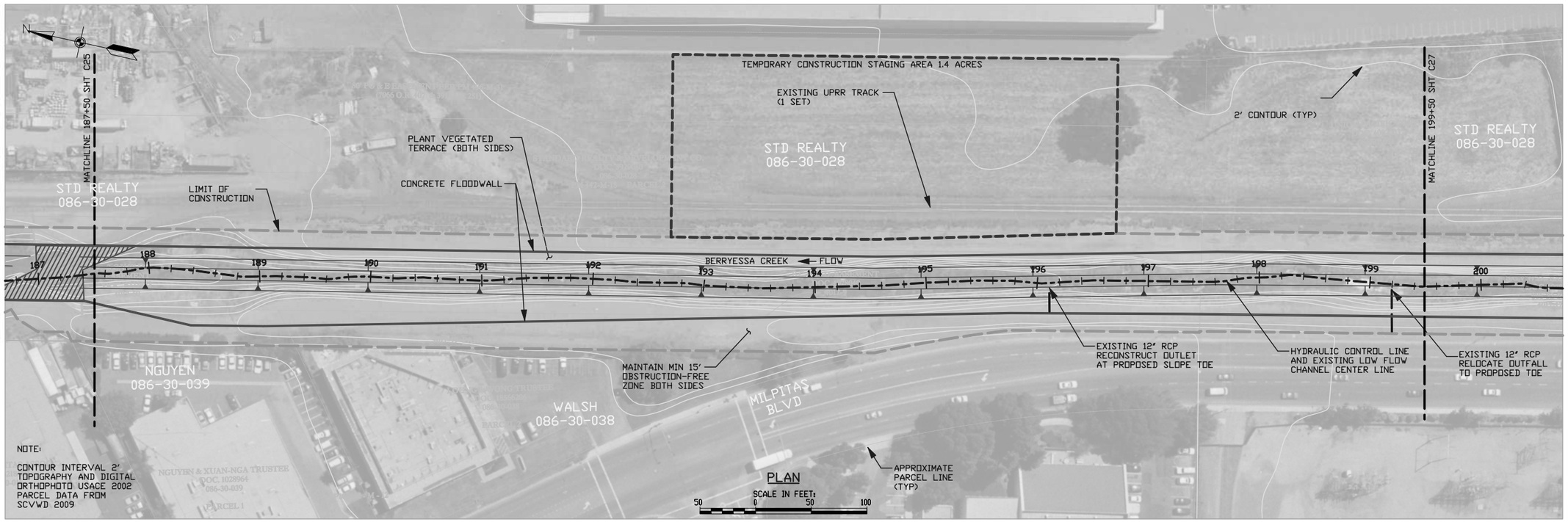

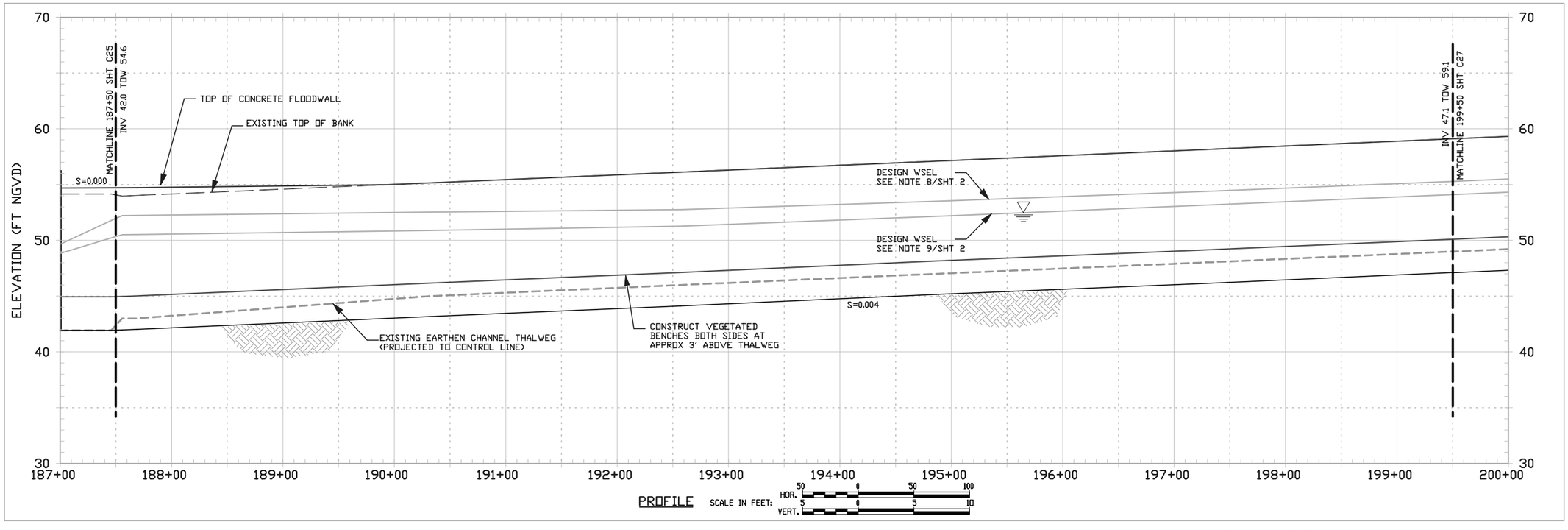

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U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
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ALTERNATIVES FORMULATION

ALTERNATIVE 4B/d
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STA. 187+00 TO 200+00

Sheet reference number:
C26
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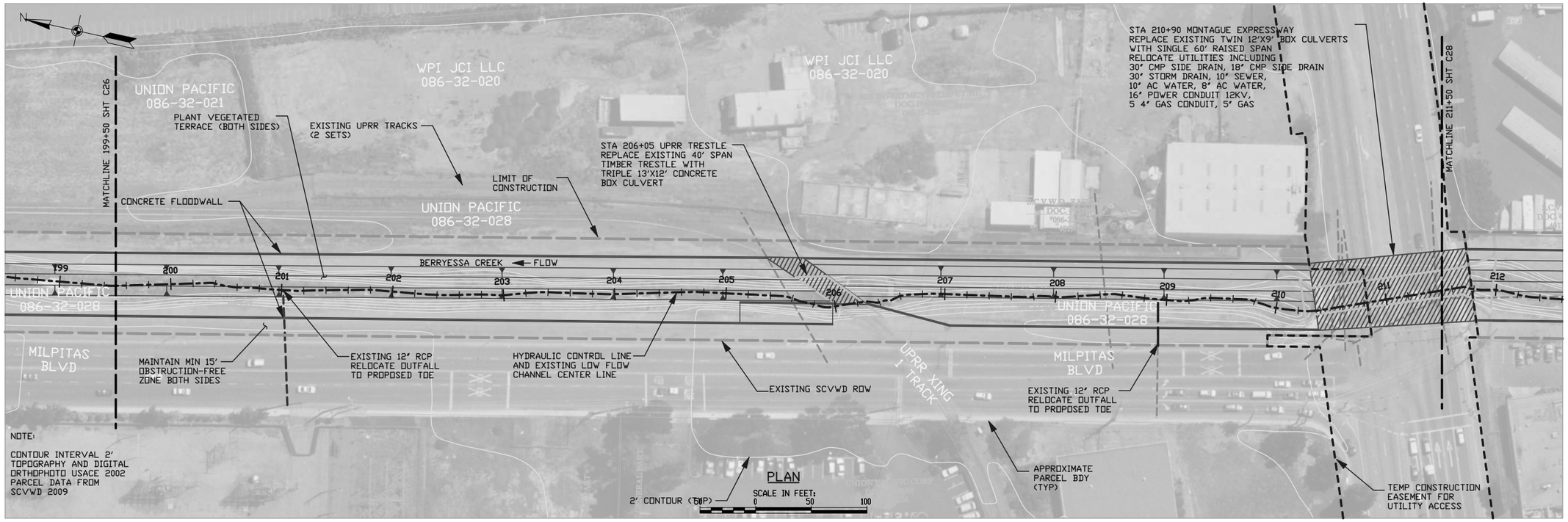

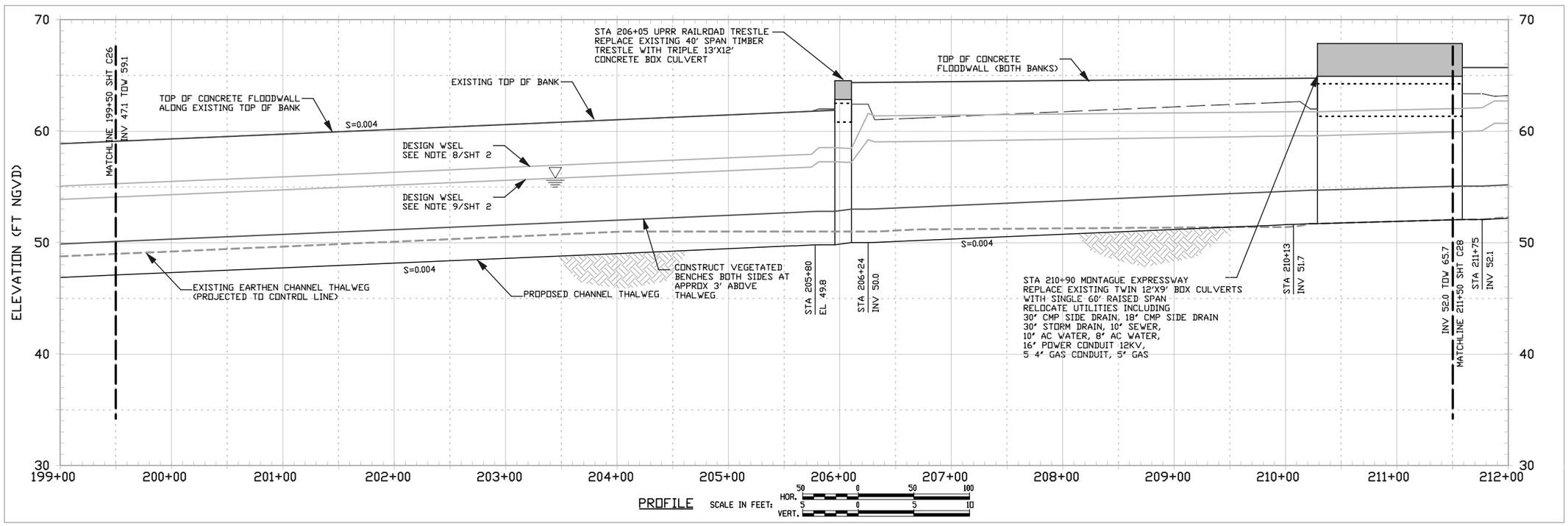

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C27
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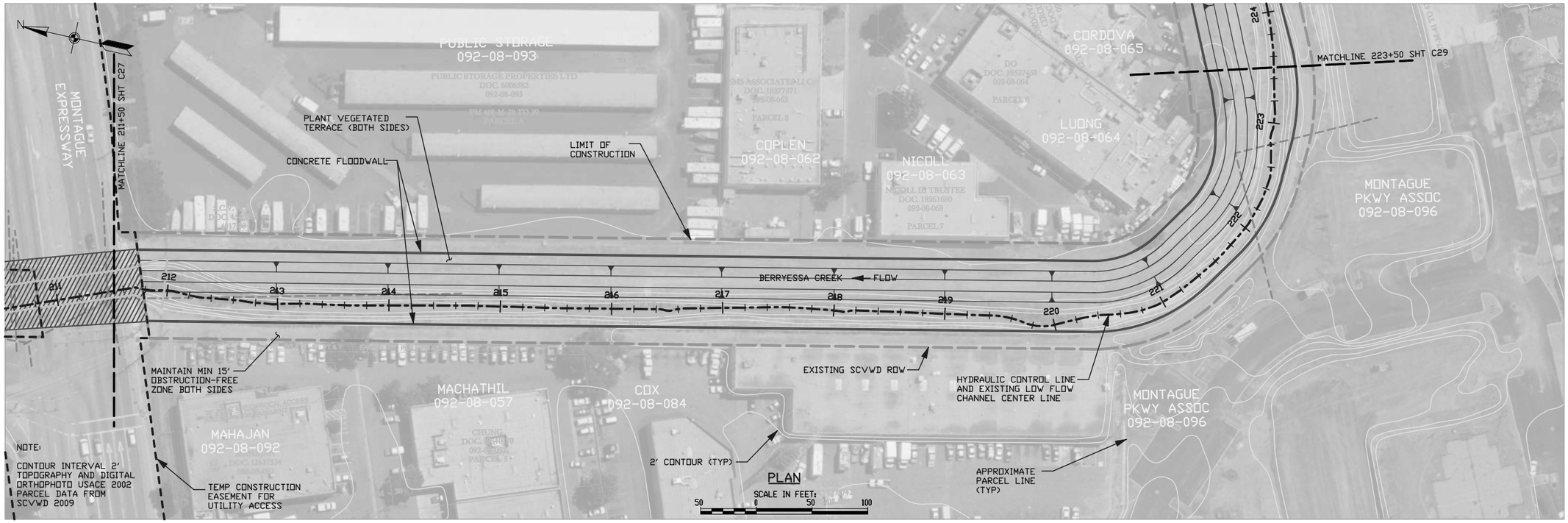
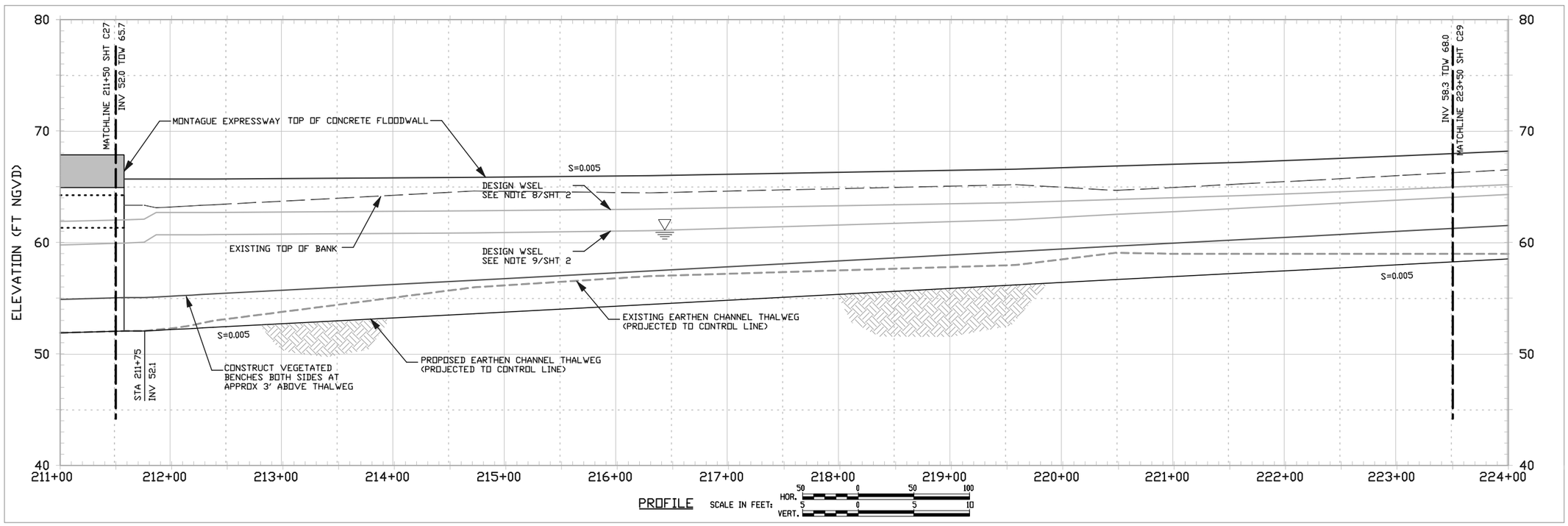




DRAFT DESIGN - FOR PLANNING PURPOSES ONLY

US Army Corps of Engineers
Sacramento District

Symbol	Description	Date Approved

Date: JAN 17, 2012 | Rev. N/A
Spec No.: N/A | Design file no: N/A
Drawing Code:
File name: BER PP C-XX
Prior date: DEC 22, 2011
Prior scale: 50/100
Designed by: PRELIMINARY
Dwn by: KP
Reviewed by: RM
Submitted by:
CHIEF, CIV ENGR DES SEC A

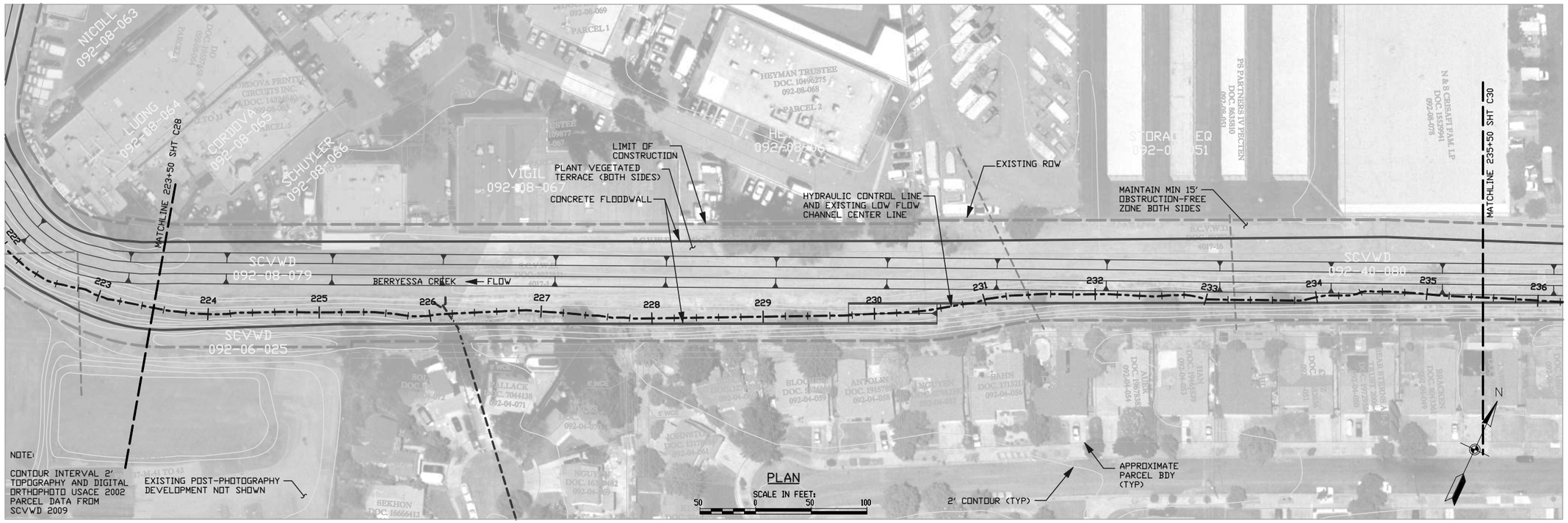
U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
IN PARTNERSHIP WITH:
SANTA CLARA VLY WATER DISTRICT

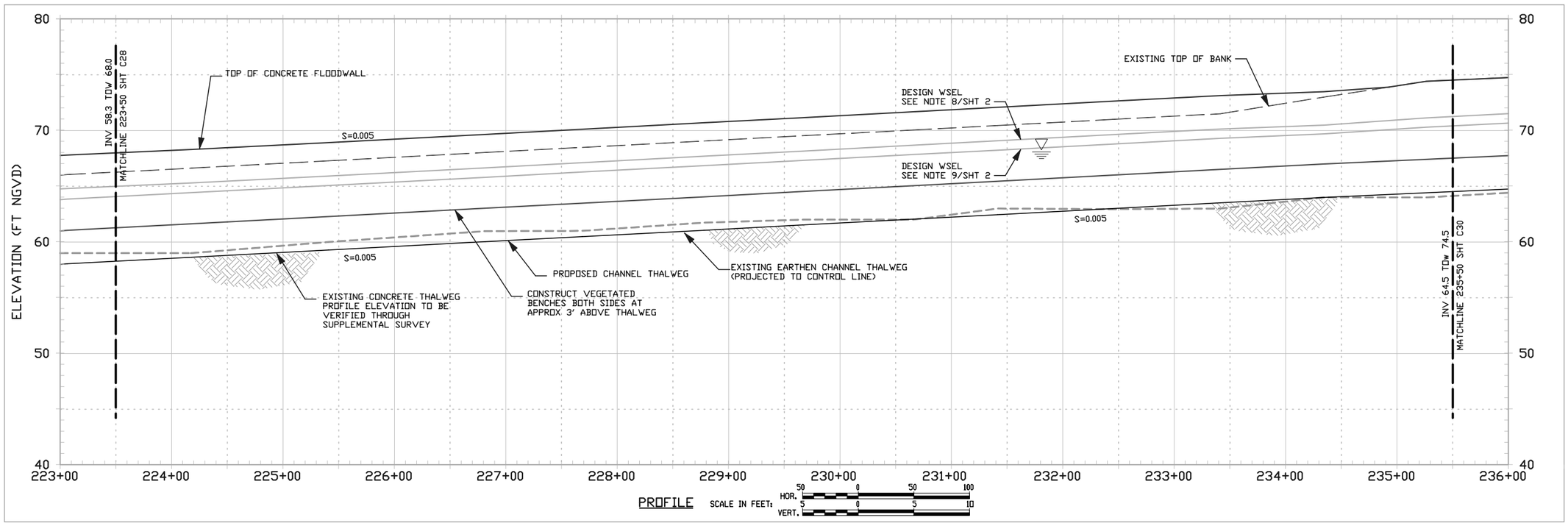
PREPARED BY:
TETRA TECH, INC.
17770 CARTWRIGHT, STE. 500
IRVINE, CA 92614

SANTA CLARA COUNTY
CALIFORNIA
BERRYESSA CREEK PROJECT
GENERAL REEVALUATION STUDY
ALTERNATIVES FORMULATION

ALTERNATIVE 4B/d
PLAN AND PROFILE VIEW
STA. 211+00 TO 224+00

Sheet reference number:
C28
Sheet 33 of 35





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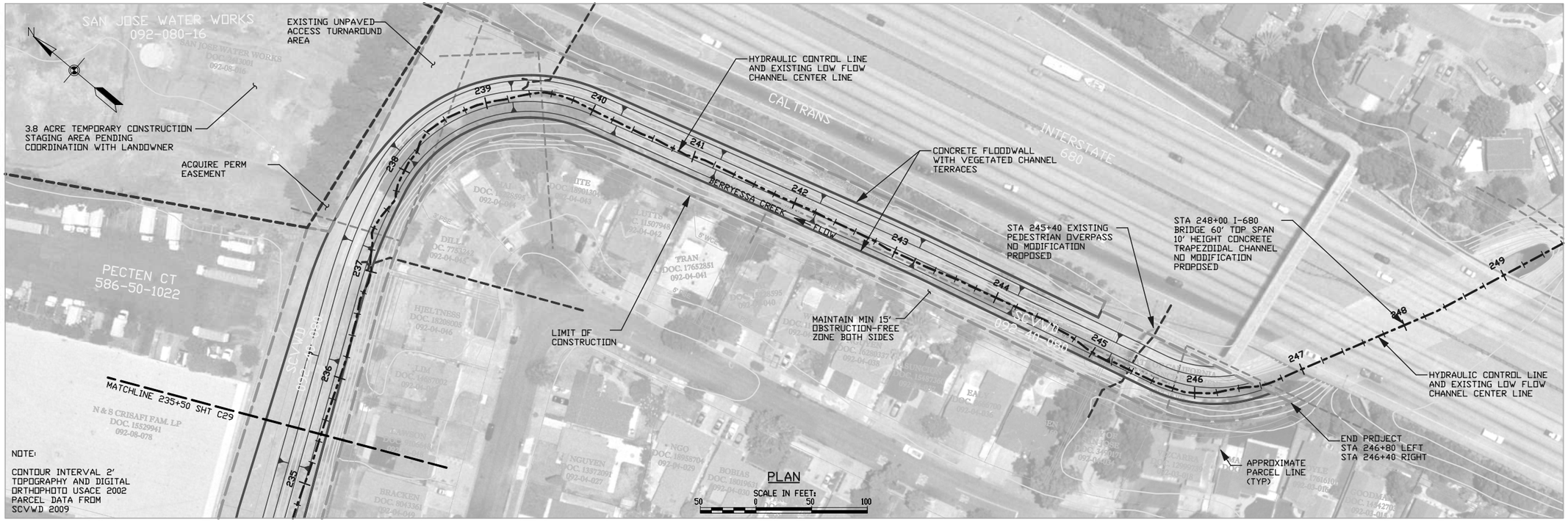
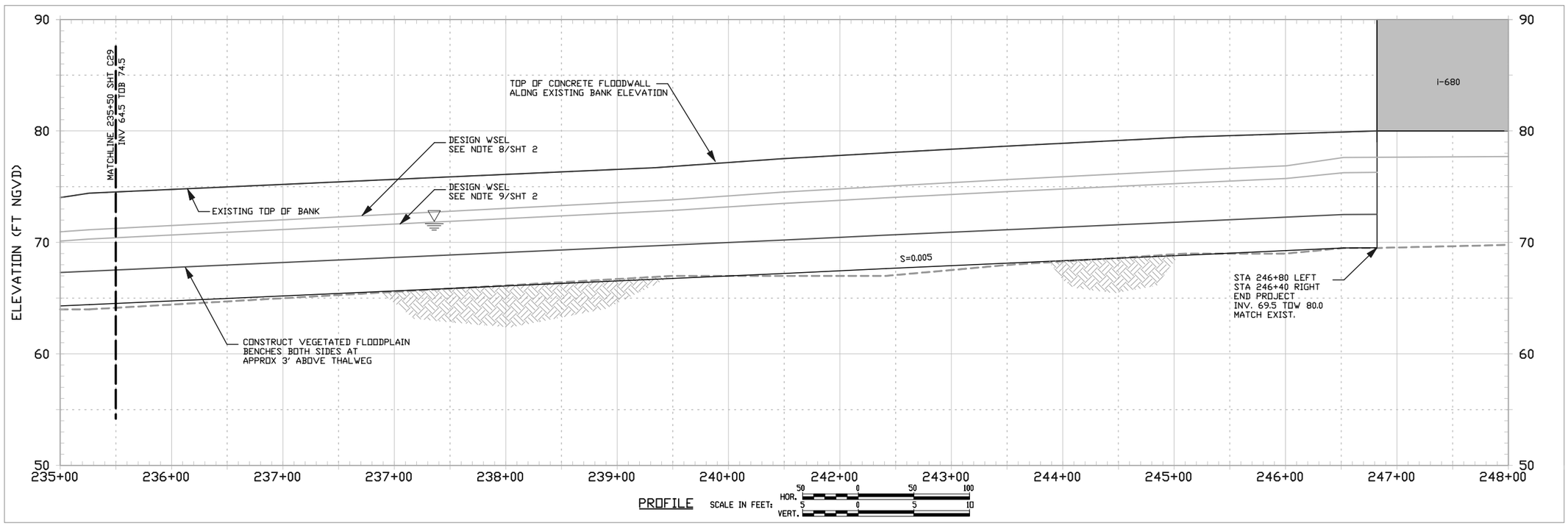
PLAN AND PROFILE VIEW
STA. 223+00 TO 236+00

Sheet reference number:
C29
Sheet 34 of 35





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PLAN AND PROFILE VIEW
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Sheet reference number:
C30
Sheet 35 of 35